Florida Department of Education

CTE Curriculum Frameworks

Agriculture, Food & Natural Resources

Rule 6A-6.0571, F.A.C.
Effective December 2025

Florida Department of Education
Curriculum Framework

Program Title: **Landscape Operations**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8002100
CIP Number	0101060511
Grade Level	9-12
Program Length	6 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	37-3011 -- Landscaping and Groundskeeping Workers 37-1012 -- First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills and occupation-specific skills and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction totaling 6 credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ
8121510	Introductory Horticulture 2	AGRICULTUR 1 @2	1 credit	37-3011	3	CT
8121520	Horticulture Science 3		1 credit	37-3011	3	CT
8121310	Landscape and Turf Science 4	AGRICULTUR 1 @2 HORTICULT #7	1 credit	37-1012	2	CT
8121320	Landscape and Turf Science 5		1 credit	37-1012	2	CT
8121410	Sports & Recreational Turf Operations 6		1 credit	37-1012	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure and technical systems.
08.0 Explore AFNR professional development organizations.

Introductory Horticulture 2

09.0 Describe the horticulture industry.
10.0 Identify safety procedures in the workplace.
11.0 Identify and classify plants.
12.0 Demonstrate plant propagation techniques.
13.0 Identify growing media and fertilizers.
14.0 Explain irrigation techniques for plants and turf.
15.0 Describe Integrated Pest Management approaches.
16.0 Describe the principles and requirements of plant growth.
17.0 Apply best management practices in the horticulture industry.
18.0 Identify principles of landscape design.
19.0 Describe varieties and care of indoor plants.
20.0 Apply safety procedures in the workplace.

Horticulture Sciences 3

21.0 Classify plants based on scientific principles.
22.0 Demonstrate proper use of growing media and fertilizers.
23.0 Demonstrate Integrated Pest Management approaches.
24.0 Identify the principles and requirements of plant growth.
25.0 Apply best management practices in landscape design.
26.0 Demonstrate customer service skills that are essential in dealing with clients.
27.0 Apply principles of landscape design and maintenance.
28.0 Harvest, transport, and install plant materials.
29.0 Identify procedures to operate, repair and maintain tools and equipment.
30.0 Identify emerging technologies in the horticulture industry.
31.0 Demonstrate leadership, employability, communications and human relations skills.

32.0 Describe personal traits, attitudes, customer approaches and activities that help successful selling.
33.0 Maintain tools and equipment.

Landscape and Turf Science 4
34.0 Demonstrate application of chemicals and calibrate spray equipment.
35.0 Classify plants and turfgrass.
36.0 Demonstrate fertilization skills.
37.0 Irrigate plants and turf.
38.0 Layout and/or install landscape and/or interiorscape.
39.0 Maintain customer relations and observe follow-up procedures.
40.0 Perform service on tools and equipment.

Landscape and Turf Science 5
41.0 Apply chemicals and calibrate spray equipment.
42.0 Perform classification of plants and turfgrass.
43.0 Use fertilization skills.
44.0 Perform irrigation of plants and turf.
45.0 Maintain landscape.

Sports and Recreational Turf Operations 6
46.0 Identify components of athletic fields.
47.0 Maintain athletic fields.
48.0 Develop recreational areas.
49.0 Maintain sports turf.
50.0 Establish turfgrass.
51.0 Tending and rejuvenating turf.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Introductory Horticulture 2**
Course Number: **8121510**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of career opportunities; global importance of agriculture; plant classification; propagation; growing media; nutritional needs; fertilization; irrigation; pest identification; pest control, pruning; plant installation; transplanting; safe hand-tool use; and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Describe the horticulture industry. The student will be able to:	
09.01	Describe the importance of horticulture to the American and global economies.	
09.02	Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.	
09.03	Describe Florida laws and regulation as they apply to the horticulture industry.	
09.04	Describe the importance of horticulture to the environment, including sustainability practices	
10.0	Identify safety procedures in the workplace. The student will be able to:	
10.01	Identify the common causes of accidents in the horticulture industry.	
10.02	Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.	
10.03	Explain, identify and utilize pertinent information from a container label and/or Safety Data Sheet (SDS) according to Environmental Protection Agency (EPA), Worker Protection Standard and Occupational Safety and Health Agency (OHSA) Regulations.	
11.0	Identify and classify plants. The student will be able to:	
11.01	Identify plants by botanical and common names.	PS.02.01.02.b
11.02	Classify plants botanically.	PS.02.01.02.c
11.03	Write botanical names for plants.	
12.0	Demonstrate plant propagation techniques. The student will be able to:	
12.01	Identify propagating and growing facilities and structures.	

CTE Standards and Benchmarks		National Standards
	12.02 Prepare propagation media.	PS.01.02.01.a
	12.03 Select and collect propagation materials.	PS.01.02.01.c
	12.04 Demonstrate propagation by sexual and asexual methods.	PS.03.01.01.b PS.03.01.03.b
	12.05 Demonstrate environmental controls for propagation materials.	
	12.06 Identify and select proper rooting hormones based on plant characteristics.	
13.0	Identify growing media and fertilizers. The student will be able to:	
	13.01 Identify soil and media materials and appropriate containers.	
	13.02 Identify nutritional needs of plants.	PS.01.03.01.a
	13.03 Identify symptoms of nutritional deficiencies and toxicities of plants.	PS.01.03.02.c
	13.04 Identify types and kinds of fertilizers.	PS.01.03.04.a
	13.05 Identify methods of distributing fertilizers.	PS.01.03.04.c
	13.06 Interpret information on a label of fertilizer used in Florida.	
14.0	Explain irrigation techniques for plants and turf. The student will be able to:	
	14.01 Identify water needs of plants.	PS.01.01.03.a
	14.02 Irrigate plants at recommended rates.	
	14.03 Identify the symptoms of excessive water and water stress in plants.	
	14.04 Describe the basic irrigation systems and principles used in the landscape and nursery.	
15.0	Describe Integrated Pest Management approaches. The student will be able to:	
	15.01 Identify common pests and pathogens of plants.	PS.03.03.01.a
	15.02 Describe life cycles of common pests and pathogens of plants.	PS.03.03.02.a
	15.03 Recognize signs of damage from pests and pathogens.	PS.03.03.02
16.0	Describe the principles and requirements of plant growth. The student will be able to:	
	16.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis and respiration.	PS.02.03.01.a
	16.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.	PS.02.03.01.b
	16.03 Explain the process of respiration and transpiration and describe the flow of energy in plants.	PS.02.03.02.b

CTE Standards and Benchmarks		National Standards
	16.04 Describe the influence of light and temperature on plant growth including phototropism.	
17.0	Apply best management practices in the horticulture industry. The student will be able to:	
	17.01 Identify and apply Best Management Practices to reduce pollution and conserve water.	
	17.02 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants including turf.	
	17.03 Explain the concept of nonpoint source pollution and the watershed environment.	
18.0	Identify principles of landscape design. The student will be able to:	
	18.01 Conduct a customer interview to determine needs and personal tastes of client.	PS.04.02.01.a
	18.02 Compare and contrast the use of line, form, texture and color in designing landscapes.	
	18.03 Identify the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.	PS.04.02.02.b
	18.04 Identify points of emphasis and major design areas in the residential landscape.	
	18.05 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.	
	18.06 Read and interpret a landscape plan.	
	18.07 Develop skills for drawing and identifying symbols.	
	18.08 Draw and design a landscape plan for a small garden.	
	18.09 Explore different types of landscape design software.	PS.04.02.02.c
19.0	Describe varieties and care of indoor plants. The student should be able to:	
	19.01 Identify common indoor plants	
	19.02 Describe the lighting and environmental needs of indoor plants.	
	19.03 Describe water, cleaning and fertilizations needs for plants used indoors.	
	19.04 Describe the most common problems with indoor foliage including pathogens, pests and cultural damage.	
	19.05 Analyze the air quality benefits of indoor plants.	
	19.06 Explain proper chemical use and application of plants indoors in accordance with governmental and public safety regulations.	

Florida Department of Education
Student Performance Standards

Course Title: Horticulture Science 3
Course Number: 8121520
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of industry regulations; plant classification; plant transportation; soil sampling and analysis; fertilizer calculations; recording keeping; irrigation components, water quality; drainage; integrated pest management; pesticide safety and regulations; equipment calibration; chemical growth regulators; xeriscaping; integrated landscape management; safe use of power equipment; record keeping; and employability skills.

CTE Standards and Benchmarks		National Standards
20.0	Apply safety procedures in the workplace. The student will be able to:	
20.01	Describe emergency procedures in the horticulture workplace.	CS.03.03.02.b
20.02	Create preventive measures to avoid hazardous situations.	CS.03.03.01.a
20.03	Identify appropriate PPE (Personal Protective Equipment) for all activities.	CS.03.04.01.b
20.04	Use SDS for all materials used.	CS.03.01.01.a
20.05	Identify specific hazards with industry specific equipment and conduct equipment care and maintenance.	CS.03.04.02.a
20.06	Apply problem solving skills to correct a hazardous situation.	CS.03.01.02.c
21.0	Classify plants based on scientific principles. The student will be able to:	
21.01	Describe principles of plant biology and growth.	PS.01.01.01.a
21.02	Explain the role of plants in the ecosystem.	
21.03	Describe the major classifications of plants based on life cycle.	PS.02.01.01.c
21.04	Demonstrate the use of botanical and common names of plants including genus and specific epithet and cultivar.	PS.02.01.02.c
21.05	Demonstrate proper use of botanical names.	PS.02.01.01.a
22.0	Demonstrate proper use of growing media and fertilizers. The student will be able to:	
22.01	Apply information on a label of fertilizer, including updated BMP rules, used in Florida.	PS.01.03.04.b
22.02	Apply fertilizer and soil amendments.	
22.03	Identify materials that are needed to alter pH and calculate the amount to apply to change the pH.	PS.01.03.02.a

CTE Standards and Benchmarks		National Standards
	22.04 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.	PS.01.03.04.c
	22.05 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.	PS.01.03.01.a
	22.06 Using references make fertilizer recommendations for ornamental plants, turf grass and palms.	PS.01.03.03.c
23.0	Demonstrate Integrated Pest Management approaches. The student will be able to:	
	23.01 Classify insects according to feeding habits.	PS.03.03.01.a
	23.02 Describe IMP (Integrated Pest Management) methods of controlling plant pests.	PS.03.03.03.a
	23.03 Diagnose and outline a plan for controlling pests on a horticultural crop.	PS.03.03.03.c
	23.04 Describe methods of controlling nematode pests on ornamental plants, and use BMPs to prevent infestation.	
	23.05 Develop a pest control program for a horticultural crop using Integrated Pest Management.	
	23.06 Identify specific cultural, mechanical, chemical and biological methods of weed management.	
	23.07 Identify evasive and poisonous plants in Florida.	
	23.08 Identify types of weeds common to Florida.	
24.0	Identify the principles and requirements of plant growth. The student will be able to:	
	24.01 Demonstrate methods of pruning plants.	
	24.02 Identify appropriate time to prune plants.	
	24.03 Identify and select pruning tools.	
	24.04 Demonstrate proper use of pruning tools and care.	
	24.05 Demonstrate sanitation of tools to prevent the spread of disease.	
	24.06 Identify Plant Growth Regulators and their use on horticulture and landscape plants.	
	24.07 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.	
	24.08 Identify appropriate pruning techniques to achieve plant size, form and shape.	
25.0	Apply best management practices in landscape design. The student will be able to:	
	25.01 Identify and apply Best Management Practices for the design and installation of landscapes.	PS.04.01.01.a
	25.02 Identify and apply Best Management Practices on the management and handling of pesticides.	
26.0	Demonstrate customer service skills that are essential in dealing with clients. The student will be able to:	
	26.01 Demonstrate ability to communicate clearly with the client.	

CTE Standards and Benchmarks		National Standards
	26.02 Conduct a walk through and interview with client to assure clear vision.	
	26.03 Identify future expectations of the client relationship.	
27.0	Apply principles of landscape design and maintenance. The student will be able to:	
	27.01 Demonstrate the use of line, form, texture and color in designing landscapes.	PS.04.01.01.c
	27.02 Demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.	PS.04.02.01.a
	27.03 Apply points of emphasis and major design areas in the commercial landscape.	
	27.04 Identify plant selection for a commercial and residential landscape using Florida Friendly Landscape Principles.	
	27.05 Create a landscape plan for a residential or commercial property.	
	27.06 Create a complete estimate and proposal for a project.	
	27.07 Identify factors in selecting turf for landscape installation.	
	27.08 Identify parts of an estimate and proposal for a project.	
28.0	Harvest, transport, and install plant materials. The student will be able to:	
	28.01 Determine requirements for preserving plant viability.	
	28.02 Demonstrate proper landscape plant establishment techniques.	
	28.03 Select and prepare plants for transporting and transplanting.	
	28.04 Select horticultural products according to Florida grades and standards.	
29.0	Identify procedures to operate, repair, and maintain tools and equipment. The student will be able to:	
	29.01 Perform equipment pre-operational check.	
	29.02 Identify, maintain, and operate hand tools and power tools.	
30.0	Identify emerging technologies in the horticulture industry. The student will be able to:	
	30.01 Research DNA and genetic applications in horticulture including the theory of probability.	
	30.02 Research advances in biotechnology that impact horticulture. (e.g., transgenic crops, biological controls, micro propagation etc.).	
	30.03 Research ways that GIS, Remote sensing, and precision agriculture, and UAV or RPA (Unmanned Ariel Vehicles) (Remotely Piloted Aircraft) are used in the Horticulture industry.	
31.0	Demonstrate leadership, employability, communications and human relations skills. The student will be able to:	
	31.01 Identify appropriate work habits and personal characteristics.	

CTE Standards and Benchmarks		National Standards
	31.02 Identify proper employee hygiene habits.	
	31.03 Identify or demonstrate appropriate responses to criticism from employer,	
	31.04 Describe the importance of employee industry certifications.	
	31.05 Discuss education opportunities available in the area of Horticulture.	
32.0	Describe personal traits, attitudes, customer approaches and activities that help successful selling. The student will be able to:	
	32.01 Demonstrate proper customer communication techniques.	
	32.02 Determine your products pricing structure.	
	32.03 Discuss components of customer satisfaction.	

Florida Department of Education
Student Performance Standards

Course Title: **Landscape and Turf Science 4**
Course Number: **8121310**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of use and maintenance of landscape and turf equipment; classification of plants and turfgrass; fertilization; and irrigation.

CTE Standards and Benchmarks		National Standards
33.0	Maintain tools and equipment. The student will be able to:	
33.01	Maintain oil level in engines of power equipment.	
33.02	Check and maintain tire air pressure on equipment.	
33.03	Maintain fuel levels using proper fuel or fuel mixtures.	
33.04	Demonstrate proper equipment operations.	
33.05	Identify, safely operate, and maintain tractor and power equipment.	
34.0	Demonstrate application of chemicals and calibrate spray equipment. The student will be able to:	
34.01	Select, mix, and apply a non-restricted chemical according to the label and local, state, federal and EPA regulations.	
34.02	Discuss appropriate responses to chemical or fertilizer spills.	
34.03	Identify and treat insect, pests and disease damage on plants and turf.	
34.04	Diagnose and treat an insect or disease problem on turf.	
34.05	Identify and treat common weeds in Florida turf grasses.	
35.0	Classify plants and turfgrass. The student will be able to:	
35.01	Classify plants including turfgrass as annuals, biennials, and perennials.	
35.02	Identify plants including turfgrass that are specific to a region.	
36.0	Demonstrate fertilization skills – the students will be able to:	
36.01	Develop a fertilization schedule.	
36.02	Interpret fertilizer charts and develop recommendations according to turf species.	

CTE Standards and Benchmarks		National Standards
	36.03 Determine rate of fertilizer application.	
	36.04 Calibrate fertilizer equipment.	
37.0	Irrigate plants and turf. The student will be able to:	
	37.01 Identify various types of irrigation systems.	
	37.02 Install and maintain piping and water distribution components.	
	37.03 Install valves, timers, rain shut-offs, moisture sensors and back flow prevention devices.	
	37.04 Design a microirragation system.	
	37.05 List problems associated with improper design, installation and maintenance.	
38.0	Layout and/or install landscape and/or interiorscape. The student will be able to:	
	38.01 Prepare final grade.	
	38.02 Prepare landscape and/or interiorscape.	
	38.03 Install mulch and perform final cleanup.	
	38.04 Calculate labor and material costs associated with installation.	
39.0	Maintain customer relations and observe follow-up procedures. The student will be able to:	
	39.01 Conduct walk-through of project with client to assure satisfaction.	
	39.02 Identify current and future maintenance requirements.	
	39.03 Analyze project records for profitability and employee performance	

Florida Department of Education
Student Performance Standards

Course Title: **Landscape and Turf Science 5**
Course Number: **8121320**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of chemical application; equipment calibration; analyzing and designing landscape and turf; preparing estimates and contracts; and lay out and installation of landscape, interiorscape and turf.

CTE Standards and Benchmarks		National Standards
40.0	Perform service on tools and equipment. The student will be able to:	
40.01	Service and maintain battery and electrical systems.	
40.02	Perform minor tune-up on engines.	
40.03	Load, balance, secure and transport equipment.	
40.04	Demonstrate safety precautions while working with tools and equipment.	
41.0	Apply chemicals and calibrate spray equipment. The student will be able to:	
41.01	Calibrate spray and spread equipment.	
41.02	Determine chemical compatibility.	
41.03	Determine appropriate time frequency and method of chemical application according to the label.	
41.04	Apply Best Management Practices for fertilizer and any additional chemicals.	
42.0	Perform classification of plants including turfgrass. The student will be able to:	
42.01	Classify plants including turfgrass according to growth habit.	
42.02	Identify hazardous, poisonous and evasive plants.	
43.0	Use fertilization skills.	
43.01	Determine rate of fertilizer application.	
43.02	Calibrate fertilizer equipment.	
44.0	Perform irrigation of plants including turf. The student will be able to:	
44.01	Check and evaluate irrigation system performance.	

CTE Standards and Benchmarks		National Standards
	44.02 Maintain irrigation system.	
	44.03 Recognize symptoms of water stress on plants including turf grasses.	
	44.04 Apply general knowledge of appropriate state laws and local ordinances to irrigation practices.	
45.0	Maintain landscape. The student will be able to:	
	45.01 Perform maintenance inspection of the project.	
	45.02 Determine water requirements and apply at proper rates using various forms of technology.	
	45.03 Identify weeds and apply herbicides safely.	
	45.04 Determine fertilization requirements and apply at proper rates.	
	45.05 Identify plant pest and disease problems and apply corrective measures.	
	45.06 Trim and prune landscape plants.	
	45.07 Maintain turf viability; mow at proper height and frequency, blade edge, line trim and remove trash.	
	45.08 Explain cause and effect of soil compaction and thatch buildups and determine appropriate methods of correction.	
	45.09 Identify mulch selection to cultivate plantings.	
	45.10 Brace and repair trees including palms.	
	45.11 Provide protection for plants from adverse weather conditions.	
	45.12 Comply with local, state and federal regulations and laws regarding landscape maintenance and pesticide applications.	

Florida Department of Education
Student Performance Standards

Course Title: **Sports and Recreational Turf Operations 6**
Course Number: **8121410**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of chemical application; equipment calibration; analyzing and designing turf; and lay out and installation of turf.

CTE Standards and Benchmarks		National Standards
46.0	Identify components of athletic fields. The student will be able to:	
46.01	Identify turf selection for various athletic fields.	
46.02	Identify appropriate dimensions for different athletic fields and specific requirements.	
47.0	Maintain athletic fields. The student will be able to:	
47.01	Apply proper line marks for athletic fields.	
47.02	Painting fields (school logos or names)	
47.03	Apply proper techniques for clay maintenance.	
47.04	Mow grass to appropriate height for field use.	
47.05	Compare and contrast professional and recreational level sports fields.	
48.0	Develop recreational areas. The student will be able to:	
48.01	Establish plant beds with annuals, biennials and perennials.	
48.02	Plant accent trees and shrubs in a recreational area.	
48.03	Establish sports turf.	
48.04	Compare and contrast active versus passive; public versus restricted areas	
49.0	Maintain sports turf. The student will be able to:	
49.01	Mow sport turf with reel mowers.	
49.02	Irrigate turf.	
49.03	Verticut turf.	

CTE Standards and Benchmarks		National Standards
	49.04 Aerate turf and remove debris.	
	49.05 Identify turf grass cultural practices for specific sports.	
50.0	Establish turfgrass. The student will be able to:	
	50.01 Level seedbed.	
	50.02 Plant turf by sprigs, plugs or sod.	
	50.03 Remove sod with sod cutter.	
51.0	Tending and rejuvenating turf. The student will be able to:	
	51.01 Apply top dressing.	
	51.02 Overseed turf.	
	51.03 Irrigate turf.	
	51.04 Aerate turf.	
	51.05 Apply fertilizer.	
	51.06 Identify and preform procedures for emergency repairs on turf.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Agriculture Biotechnology**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8003100
CIP Number	0126120101
Grade Level	9-12
Program Length	5 credits
Teacher Certification	Refer to the **Program Structure** section
CTSO	FFA
SOC Codes (all applicable)	19-4021 -- Biological Technicians 19-1011 -- Animal Scientists 19-1013 -- Soil and Plant Scientists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.
To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTURE 7 G AGRICULTUR 1 @2	1 credit		3	EQ
8106850	Agricultural Biotechnology 2	AGRICULTUR 1 @2	1 credit	19-4021	3	CT
8106860	Agricultural Biotechnology 3		1 credit	19-4021	3	EQ
8106120	Animal Biotechnology		1 credit	19-1011	3	CT
8106510	Plant Biotechnology		1 credit	19-1013	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1
01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Agricultural Biotechnology 2
09.0 Identify the historical, social, cultural and potential applications of biotechnology.
10.0 Conduct scientific investigation and apply results.
11.0 Practice agricultural laboratory safety.
12.0 Apply genetic principles to agricultural production.
13.0 Demonstrate laboratory skills as applied to biotechnology.
14.0 Demonstrate the application of biotechnology to AFNR.

Agricultural Biotechnology 3
15.0 Recognize and follow quality control procedures and regulatory guidelines.
16.0 Analyze the historical, social, cultural and potential applications of biotechnology.
17.0 Demonstrate proper tissue/cell culture techniques.
18.0 Demonstrate the application of biotechnology to the AFNR industries.
19.0 Demonstrate leadership, employability, communication and human relation skills.

Animal Biotechnology
20.0 Apply genetic principles to animal science.
21.0 Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization.
22.0 Examine the developmental processes that determine animal growth.
23.0 Investigate the reproduction system of animals.
24.0 Describe animal science and the role of animals in society.

Plant Biotechnology
25.0 Describe plant classifications and the economic impact to your region.
26.0 Apply genetic principles to plant improvement.
27.0 Demonstrate methods of micropropagating plants.

28.0 Demonstrate methods of plant production.
29.0 Use plants to demonstrate growth disorders (nutrients, pathogens, pests).
30.0 Identify the historical, social, cultural and potential applications of plant biotechnology.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Biotechnology 2**
Course Number: **8106850**
Course Credit: **1**

Course Description:

This course was developed as a core and is designed to develop competencies in the areas of agricultural biotechnology in agriculture, scientific investigation, laboratory safety, scientific and technological concepts, and the fundamentals of biotechnology.

CTE Standards and Benchmarks		National Standards
09.0	Identify the historical, social, cultural and potential applications of biotechnology. The student will be able to:	
09.01	Define biotechnology and explore the historical impact on agriculture.	
09.02	Analyze the developmental progression of biotechnology and the evolution of scientific knowledge	BS.01.01.01.b
09.03	Distinguish between current and emerging applications of biotechnology in agriculture.	BS.01.01.03.a
09.04	Explain the relationship between regulatory agencies and the protection of public interests such as health, safety, and the environment.	BS.01.02.03.a
09.05	Compare and contrast differences between regulatory systems worldwide.	BS.01.02.01.b
09.06	Research and document major regulatory issues related to biotechnology in agriculture.	BS.01.02.02.a
09.07	Explore ethical, legal, and social biotechnology issues.	
09.08	Evaluate the short-term and long-term benefits and risks of applying biotechnology to agriculture.	BS.01.01.04.c
09.09	Investigate the emergence and evolution of biological organisms and their use in biotechnology.	
09.10	Research and summarize legal issues related to biotechnology in agriculture (e.g., protection of intellectual property through patents, copyright, trademarks, …)	BS.01.03.02.a
09.11	Devise and support an argument for or against an ethical issue associated with biotechnology in agriculture.	BS.01.03.01.c
10.0	Conduct scientific investigation and apply results. The student will be able to:	
10.01	Discuss the differences between scientific laws and scientific theories.	
10.02	Design an agricultural experiment using appropriate control measures.	

CTE Standards and Benchmarks		National Standards
	10.03 Collect and record data using SI units.	
	10.04 Using the scientific method summarize data, draw conclusions, and plan follow-up experiments.	
11.0	Practice agricultural laboratory safety. The student will be able to:	
	11.01 Identify first aid supplies, personnel and emergency protection areas.	
	11.02 Monitor, use, store and dispose of hazardous materials and disposal of biological pathogens according to industry practices.	
	11.03 Document safety training and practices (reading and interpreting) using Safety Data Sheets (SDS) and Occupational Safety and Health Administration (OSHA) standards.	
	11.04 Demonstrate and utilize safety equipment.	
	11.05 Identify safety symbols and signs.	
	11.06 Demonstrate appropriate safety procedures and guidelines and discuss implications of safety violations.	
12.0	Apply genetic principles to agricultural production. The student will be able to:	
	12.01 Describe the relationship between reproduction and genetic improvement.	
	12.02 Demonstrate how traits are inherited.	
	12.03 Describe how genetic processes and structures control inheritance.	
	12.04 Predict probable results of single or multiple trait crosses.	
	12.05 Differentiate between dominant and recessive traits.	
	12.06 Compare and contrast the structures of DNA and RNA and how they are manipulated.	BS.02.05.02.a
	12.07 Investigate how genotype influences phenotype.	
	12.08 Hypothetically develop a genetic engineered species to solve an agriculture problem.	
	12.09 Assess and debate the pros and cons of transgenic species in agriculture	BS.03.01.02.b
	12.10 Perform DNA manipulations, such as cloning/subcloning, blotting, sequencing, and amplification.	
	12.11 Analyze factors that influence gene expression.	
	12.12 Describe the process of genetic marker assisted selection.	

CTE Standards and Benchmarks		National Standards
13.0	Demonstrate laboratory skills as applied to biotechnology. The student will be able to:	
13.01	Maintain and interpret laboratory and production records documented in a laboratory to ensure data accuracy and integrity	BS.02.01.01.b
13.02	Manipulate basic laboratory equipment and measurement devices.	BS.02.02.02.b
13.03	Demonstrate advanced aseptic techniques in the biotechnology laboratory.	BS.02.03.01.b
13.04	Analyze and select an appropriate standard operating procedure for working with biological materials based upon their classification.	BS.02.03.02.b
13.05	Formulate and prepare solutions using standard operating procedures (e.g., buffers, reagents, solutions, and media).	BS.02.03.03.b
13.06	Inventory biological and chemical materials and maintain accurate records of supplies and expiration dates.	BS.02.04.02.b
13.07	Isolate, maintain, quantify, and store cell cultures.	
13.08	Analyze and interpret the molecular basis for heredity and the tools and techniques used	BS.02.05.02.b
13.09	Extract and purify DNA and RNA according to standard operating procedures.	BS.02.05.03.a
13.10	Demonstrate protein separation techniques and interpret the results.	BS.02.05.04.b
13.11	Analyze and document how antibodies are formed and describe how they can be used in agriculture biotechnology.	BS.02.05.05.b
13.12	Summarize reasons for detecting microbes and identify sources of microbes.	BS.03.02.01.a
14.0	Demonstrate the application of biotechnology to AFNR. The student will be able to:	
14.01	Explain biological, social, agronomic, and economic reasons for genetic engineering of eukaryotes and prokaryotes.	BS.03.01.01.a
14.02	Differentiate the roles of carbohydrates, fats, and proteins in biotechnology applications.	
14.03	Describe the role of fermentation in biotechnology applications.	
14.04	Analyze and document the processes and describe the techniques used to produce transgenic eukaryotes.	BS.03.01.01.b
14.05	Examine enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.	BS.03.02.02.a
14.06	Describe how enzymatic reactions can be used in biotechnology based assays.	
14.07	Analyze processes by which enzymes are produced through biotechnology.	BS.03.02.02.b

CTE Standards and Benchmarks		National Standards
14.08	Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.	
14.09	Analyze the process by which organisms are genetically engineered for waste treatment.	BS.03.06.01.b
14.10	Investigate and report on genetic engineering procedures used in the production of agricultural products.	
14.11	Explain the functions of hormones in animals.	
14.12	Describe the processes used to produce animal hormones from transgenic organisms.	
14.13	Identify foods produced through fermentation.	
14.14	Compare and contrast bioengineering and conventional pathways used in food processing.	
14.15	Explain biomass and sources of biomass.	
14.16	Assess the characteristics of biomass that make it useful for biofuels production.	BS.03.05.02.b
14.17	Correlate the relationship between fermentation and the process used to produce alcohol from biomass.	BS.03.05.03.b
14.18	Analyze and document the process to produce biodiesel from biomass.	BS.03.05.04.b
14.19	Analyze and describe the process used to produce methane from biomass.	BS.03.05.05.b
14.20	Research and describe the aims and techniques involved in selective plant and animal breeding process.	BS.03.04.01.a

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Biotechnology 3**
Course Number: **8106860**
Course Credit: **1**

Course Description:

This course is designed to enhance competencies in the areas of current agricultural biotechnology applications, genetic principles, tissue/cell culture, and the potential for biotechnology in the area of agriculture.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks		National Standards
15.0	Recognize and follow quality control procedures and regulatory guidelines. The student will be able to:	
15.01	Design and conduct an experiment using tools to evaluate biotechnology derived products.	
15.02	Assess and summarize the role and scope of agencies that regulate biotechnology.	BS.01.02.01.b
15.03	Discuss quality control as it relates to products, safety, quality to the end user, and meeting regulatory specifications.	
15.04	Perform quality control methods utilizing proper documentation.	
15.05	Conduct a polymerase chain reaction to determine the presence of genetic modifications in a common food item.	
15.06	Troubleshoot aberrant results or parameters.	
16.0	Analyze the historical, social, cultural, and potential applications of agricultural biotechnology. The student will be able to:	
16.01	Research and report on the major innovators and milestones in the development of biotechnology.	
16.02	Assess and summarize current work in biotechnology being done to add value to agriculture and global society.	BS.01.01.02.b
16.03	Explain and critique a decision made by a major agency that regulates agriculture biotechnology.	BS.01.02.01.c

CTE Standards and Benchmarks		National Standards
16.04	Research and summarize the emergence, evolution and implications of bioethics associated with biotechnology in agricultural production.	BS.01.03.01.a
16.05	Analyze the implications bioethics may have on future advancements in AFNR	BS.01.03.01.b
16.06	Analyze an intellectual property issue associated with bioethics in agricultural production.	
16.07	Identify and discuss emerging technologies in agriculture production (transgenics, biologics, biosecurity, food safety, sustainability, etc.).	
16.08	Use web-based resources to find information on the genetic sequence of a protein using bioinformatics.	
17.0	Demonstrate proper tissue/cell culture techniques. The student will be able to:	
17.01	Conduct assays and experiments under aseptic conditions.	BS.02.03.01.c
17.02	Describe the effects of growth hormones on tissue/cell culture.	
17.03	Perform sterilization techniques for equipment in a laboratory using standard operating procedures.	BS.02.02.03.c
17.04	Produce plants using tissue culture methods and prepare a written report of data and results.	BS.03.04.01.c
18.0	Demonstrate the application of biotechnology to the AFNR industries. The student will be able to:	
18.01	Create a standard operating procedure for a biological process.	BS.02.03.02.c
18.02	Perform ongoing maintenance of laboratory equipment according to the standard operating procedures (e.g., calibration, testing, etc.)	BS.02.02.02.01.c
18.03	Simulate inventory control using processes such as material quarantine and release, the FIFO (first in first out) system, expiration dating, and proper storage methods for biologics and chemicals.	
18.04	Summarize what happens to different types waste after it leaves the laboratory and identify opportunities to reduce waste and unnecessary costs. (e.g., Biohazardous, toxic, pathogenic.)	BS.02.04.03.a
18.05	Evaluate the biochemical properties of proteins to explain their function and predict potential uses.	BS.02.05.04.c
18.06	Use antibodies to detect and quantify antigens by conducting an Enzyme-Linked Immunosorbent Assay (ELISA).	BS.02.05.05.c
18.07	Produce ethanol and co-products from biomass.	BS.03.05.03.c
18.08	Produce biodiesel and co-products from biomass.	BS.03.05.04.c
18.09	Produce methane and co-products from biomass.	BS.03.05.05.c
18.10	Evaluate the technologies used to create biofuels from biomass.	

CTE Standards and Benchmarks		National Standards
18.11	Discuss (or demonstrate) algae growth (culture to large scale) for biofuel production.	
18.12	Describe the principles (purpose) of centrifugation and filtration.	
18.13	Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.	BS.03.04.02.b
18.14	Analyze and summarize the risks and benefits of using biotechnology for bioremediation.	BS.03.06.04.b
18.15	Analyze the role of microorganisms in industrial chemical waste treatment.	BS.03.06.03.a
18.16	Explain the global importance of biodiversity.	
18.17	Explain the positive and negative impacts of agricultural practices on wild populations.	
18.18	Analyze how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.	BS.03.03.01.b
18.19	Describe the processes used in the production of molecules for use in industrial applications.	BS.03.03.02.b
19.0	Demonstrate leadership, employability, communication and human relation skills. The student will be able to:	
19.01	Conduct group meetings using parliamentary procedure and public speaking skills.	
19.02	Follow acceptable work habits, personal characteristics, and hygiene habits for the biotechnology workplace.	
19.03	Identify or demonstrate appropriate responses to criticism and coaching from employer, supervisor, or other persons.	
19.04	Demonstrate appropriate methods for asking questions and providing constructive criticism and feedback.	
19.05	Conduct a job search and identify advanced training opportunities and the requirements.	
19.06	Update current resume.	
19.07	Demonstrate appropriate methods for asking questions, and providing constructive criticism and feedback to supervisor, employer, supervisor, or other persons.	

Florida Department of Education
Student Performance Standards

Course Title: **Animal Biotechnology**
Course Number: **8106120**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of biotechnology in animal science, animal growth and reproduction, and the role of animals in society.

CTE Standards and Benchmarks		National Standards
20.0	Apply genetic principles to animal science. The student will be able to:	
	20.01 Describe how the concept of heritability is used in the selection of livestock.	
	20.02 Chart the difference between phenotypic and genotypic characteristics and determine probabilities.	
	20.03 Analyze performance data used in the selection process of livestock. (EPDs).	
	20.04 Use computer data to assist in the selection process of livestock.	
	20.05 Extract a visible mass of DNA from animal tissue.	
	20.06 Develop a hypothetical species using genetic engineering.	
	20.07 Debate the safeguards used in research in genetic engineering.	
21.0	Interpret the relationship between total digestible nutrients (TDN) in feeds and its utilization. The student will be able to:	
	21.01 Determine nutritional requirements of selected animals.	
	21.02 Select appropriate feed samples for analysis of nutritional values and develop a balanced ration.	
	21.03 Conduct experiments comparing growth rates using selected rations.	
	21.04 Compare how the body’s cells metabolize fats, carbohydrates, and proteins.	
	21.05 Analyze the effect of diseases on nutritional utilization.	
22.0	Examine the developmental processes that determine animal growth. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	22.01 Develop a growth curve using selected animal species.	
	22.02 Differentiate between muscle, fat, and bone development.	
	22.03 Evaluate the effects of hormones in animal production.	
	22.04 Compare morphology of developing embryos.	
	22.05 Analyze the diseases that affect development growth.	
23.0	Investigate the reproduction system of animals. The student will be able to:	
	23.01 Analyze the quality of semen of selected animals.	
	23.02 Compare and contrast sperm anatomy of selected animal species.	
	23.03 Analyze the factors that affect sperm mobility and development.	
	23.04 Compare and contrast the reproductive cycles of selected animal species.	
	23.05 Compare and contrast the breeding time and conception rates of selected animal species.	
	23.06 Describe the functions of hormones that control reproduction.	
	23.07 Discuss the use of hormone therapy to manipulate ovarian activity.	
	23.08 Describe and compare the different pathogens that cause animal diseases.	
	23.09 Analyze environmental factors the affect growth and development.	
	23.10 Analyze the mating process of selected animal species.	
24.0	Describe animal science and the role of animals in society. The student will be able to:	
	24.01 Debate current events concerning animal welfare and animal rights.	
	24.02 Demonstrate safe procedures when working with animal related equipment in laboratory settings.	
	24.03 Practice safety precautions around animals.	
	24.04 Develop a research project related to biotechnology and animal science.	
	24.05 Discuss the benefits of biotechnology in producing and marketing animals and animal products.	

CTE Standards and Benchmarks	National Standards
24.06 Research how biotechnology affects the consumer.	

Florida Department of Education
Student Performance Standards

Course Title: **Plant Biotechnology**
Course Number: **8106510**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of biotechnology in plant science, growth and reproduction, and the role of plants in biotechnology.

CTE Standards and Benchmarks		National Standards
25.0	Describe plant classifications and the economic impact to your region. The student will be able to:	
25.01	Classify plants based upon their regional use and importance.	
25.02	Describe the economic impact of regionally produced products.	
25.03	Describe factors influencing the feasibility of plant products and approaches toward achieving food sustainability within a region or community.	
25.04	Identify economically significant plant families.	
25.05	Identify at least fifty plants by common and scientific names.	
26.0	Apply genetic principles to plant improvement. The student will be able to:	
26.01	Describe the relationship between reproduction and plant improvement.	
26.02	Demonstrate the reproductive cycle in seed plants, angiosperms and gymnosperms, mosses, and ferns.	
26.03	Describe how genetic processes and structures control inheritance in plants.	
26.04	Explain polyploidy in both natural settings and in commercial plant production.	
26.05	Differentiate phenotypic versus genotypic expression in plant crosses.	
26.06	Describe the processes used for mutation induction.	
27.0	Demonstrate methods of micropropagating plants. The student will be able to:	
27.01	Evaluate the advantages and disadvantages of using micropropagation techniques.	

CTE Standards and Benchmarks		National Standards
	27.02 Demonstrate aseptic/sterile technique.	
	27.03 Prepare and mix stock solutions of media for micro-propagation.	
	27.04 Produce a crop using tissue culture methods and prepare a written report of results.	
	27.05 Propagate plants using tissue culture techniques for producing synthetic seed culture.	
	27.06 Develop and write a protocol to insert a gene of interest in plants.	
	27.07 Propagate plants using cell cultures, callus culture, and algae culture.	
	27.08 Research uses of cryopreservation in seed and in-vitro propagation methods.	
28.0	Demonstrate methods of plant production. The student will be able to:	
	28.01 Evaluate the advantages and disadvantages of non-traditional crop production techniques (hydroponic/substrate, greenhouse, tunnel/hoop, etc.).	
	28.02 Demonstrate different production methods used in hydroponics production.	
	28.03 Determine the cultural needs in hydroponics production.	
	28.04 Describe crops grown commercially by non-traditional techniques in your region.	
29.0	Use plants to demonstrate growth disorders (nutrients, pathogens, pests). The student will be able to:	
	29.01 Identify plant nutrient-related disorders.	
	29.02 Identify pathogen-related disorders in plants.	
	29.03 Identify pest-related disorders in plants.	
	29.04 Discuss how IPM and biotechnology are used to solve plant disorders.	
	29.05 Prepare plant tissue samples for submission to determine nutrient levels.	
	29.06 Demonstrate factors that affect the nutrient levels in plant tissue.	
30.0	Identify the historical, social, cultural and potential applications of plant biotechnology. The student will be able to:	
	30.01 Research and report on the major innovators and milestones in the development of biotechnology.	
	30.02 Analyze the scope and impact of plant biotechnology in today’s global society.	

CTE Standards and Benchmarks	National Standards
30.03 Assess the future impact plant biotechnology could have on world populations.	
30.04 Research, evaluate, and articulate a major regulatory issue pertaining to plant biotechnology.	
30.05 Research, evaluate, and articulate the implications of an ethical, legal, social, or cultural biotechnology issue in plant production.	
30.06 Research and debate an ethical issue associated with plant biotechnology.	
30.07 Analyze an intellectual/genetic property issue associated with bioethics in plant production.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Aquaculture**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8004100
CIP Number	0101030303
Grade Level	9-12
Program Length	4 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	45-2093 -- Farmworkers, Farm, Ranch, and Aquacultural Animals 11-9013 – Aquaculture Managers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in the planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues in the aquaculture industry.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit		3	EQ
8112010	Aquaculture 2		1 credit	45-2093	3	EQ
8112020	Aquaculture 3		1 credit	45-2093	3	EQ
8112030	Aquaculture 4		1 credit	11-9013	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Aquaculture 2

09.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture.
10.0 Describe the nature and origin of and career opportunities in aquaculture.
11.0 Demonstrate the management and environmentally sound use of water resources.
12.0 Apply biological principles to the reproduction, identification and growth of aquaculture species.
13.0 Assist in the propagation and culture of an aquaculture organism.
14.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
15.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.

Aquaculture 3

16.0 Exhibit the management and environmentally sound use of water and land resources.
17.0 Complete the propagation and culture of an aquaculture organism.
18.0 Research local aquaculture markets and marketing techniques.
19.0 Incorporate business management skills in managing an aquaculture operation.
20.0 Demonstrate leadership, employability, communication, networking, and human relations skills.
21.0 Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen.
22.0 Control disease, pest and water quality problems.
23.0 Assist in harvesting and processing aquaculture species.

Aquaculture 4

24.0 Identify biological components of reptiles, amphibians, and fish.
25.0 Discuss production practices of reptiles, amphibians, and fish.
26.0 Investigate scientific skills and principles in aquatic plant science.
27.0 Describe techniques for producing marine ornamentals, clams, oysters, and shrimp.
28.0 Manage aquatic animal health.
29.0 Determine nutritional needs of aquaculture organisms.

30.0 Manage aquaculture systems.
31.0 Perform economic practices involved with aquaculture enterprises.
32.0 Participate in classroom extension activities.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Aquaculture 2**
Course Number: **8112010**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of nature and origin, career opportunities, biological principles, safety, water quality, seed production, market outlets, rules and regulations, technological advances, problem solving and leadership employability communication and human relations skills.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
09.0	Safely operate and maintain machinery, equipment, and facilities used in aquaculture. The student will be able to:
09.01	Recognize and observe safety practices necessary in carrying out aquaculture activities.
09.02	Inspect, maintain and perform basic repairs on aquaculture machinery, equipment and facilities.
09.03	Safely operate aquaculture machinery and equipment.
09.04	Discuss the safety and maintenance of a re-circulating aquaculture system (RAS) including biological, chemical, and mechanical filtration, degassing, sterilization, and foam fractionation.
10.0	Describe the nature and origin of and career opportunities in aquaculture. The student will be able to:
10.01	List the definition of aquaculture as defined by the Florida Division of Aquaculture.
10.02	Compare and contrast aquaculture and fisheries.
10.03	List and describe major global aquatic species.
10.04	Explain the history of aquaculture.
10.05	List, describe, and research aquaculture related occupations.

CTE Standards and Benchmarks	
	10.06 Determine the educational requirements and experience needed to enter and advance in aquaculture occupations.
11.0	Demonstrate the management and environmentally sound use of water resources. The student will be able to:
	11.01 Identify and describe the physical and chemical characteristics of water for use in aquaculture.
	11.02 Explain how changes in water affect aquatic life.
	11.03 Be able to measure the total ammonia nitrogen (TAN), unionized ammonia, nitrite, nitrate in a water system.
	11.04 Be able to measure the water temperature dissolved oxygen, pH, salinity, hardness, alkalinity, turbidity, chlorine/chloramine and carbon dioxide in a water system.
	11.05 Explain how the nitrogen cycle is related to maintaining healthy fish.
12.0	Apply biological principles to the reproduction, identification and growth of aquaculture species. The student will be able to:
	12.01 Define morphology, anatomy, and physiology.
	12.02 Identify and describe the anatomy and physiology of crustaceans.
	12.03 Identify and describe the anatomy and physiology of mollusks.
	12.04 Identify and describe the anatomy and physiology of fish.
	12.05 Identify and describe the basic morphology of aquatic macroalgae and microalgae.
	12.06 List and describe important characteristics in choosing a production species.
	12.07 Identify and describe common aquaculture organism by scientific classification.
	12.08 List and describe the chemical and physical factors which influence the growth of aquatic fauna and flora.
	12.09 Identify aquaculture species of commercial importance in Florida (mollusks, alligators, fish, plants).
13.0	Assist in the propagation and culture of an aquaculture organism. The student will be able to:
	13.01 Identify/describe facilities used in a grow-out operation.
	13.02 List sources of aquaculture organisms and how they are produced.
	13.03 Determine the purpose and functions of a hatchery.
	13.04 Describe and contrast the reproductive anatomy of aquaculture organisms.

CTE Standards and Benchmarks	
	13.05 Describe and contrast types of spawning exhibited by aquaculture organisms.
	13.06 Discuss proper broodstock conditioning and spawning techniques for aquaculture organisms.
	13.07 Discuss proper grow-out techniques for aquaculture organisms.
	13.08 Demonstrate accurate data collection.
14.0	Identify applicable local, state and federal rules, regulations and best management practices. The student will be able to:
	14.01 Identify and observe laws and regulations affecting the industry in the local area.
	14.02 Describe process to obtain required permits, licenses, and leases.
	14.03 Identify and list agencies regulating the industry and their functions.
15.0	Evaluate the importance of aquaculture to understand the impact on global economy. The student will be able to:
	15.01 Assess the impact of US aquaculture products to the total global aquaculture industry.
	15.02 Recognize the value of aquaculture food products and agribusiness industry.

Florida Department of Education
Student Performance Standards

Course Title: **Aquaculture 3**
Course Number: **8112020**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of management and use of water, the propagation and rearing of seed, producing aquaculture species, control of diseases, pests and water quality problems, harvesting and processing, marketing and transportation, management skills and leadership, employability, communication and human relation skills.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
16.0	Exhibit the management and environmentally sound use of water and land resources. The student will be able to:
16.01	Calculate volume in circular, rectangular and irregular shaped water structures.
16.02	Identify and explain point and non-point pollution management associated with aquaculture.
16.03	Determine soil types, land slope and other factors to consider in choosing a location for an aquaculture operation (aquaculture structures).
16.04	Discuss Florida Department of Agriculture and Consumer Services (FDACS) Best Management Practices (BMP) for managing water usage and aquaculture affluent.
16.05	Discuss different stages of construction of ponds and/or other aquaculture production facilities.
16.06	Discuss the advantages and disadvantages of hydroponics and aquaponics.
17.0	Complete the propagation and culture of an aquaculture organism. The student will be able to:
17.01	Identify and describe the methods of reproducing aquaculture organisms.
17.02	Identify and describe the hatchery facilities used in aquaculture.
17.03	Select a method of producing seed for a selected species.

CTE Standards and Benchmarks	
	17.04 List and explain the process for hatching eggs in multiple aquaculture organisms.
	17.05 Determine the types and sizes of feeds to grow different life stages of aquaculture organisms.
	17.06 Discuss the proper methods for harvesting, grading and transporting seed, fry and juvenile aquaculture organisms.
18.0	Research local aquaculture markets and marketing techniques. The student will be able to:
	18.01 Develop a marketing plan for an aquaculture product.
	18.02 Determine laws and regulations involved in transporting and marketing aquaculture organisms.
	18.03 Market aquaculture products.
	18.04 Identify possible market outlets for aquaculture products.
	18.05 Identify the steps in securing a specific market outlet for a given species.
	18.06 Describe the product characteristics of marketable animal and plant products for both food and ornamental markets.
19.0	Incorporate business management skills in managing an aquaculture operation. The student will be able to:
	19.01 Determine cost of production/harvesting and profitability of different systems.
	19.02 Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.
	19.03 Discuss the relevance of (a) land purchase, (b) water leases, (c) permits, (d) licenses, (e) financial loans, (f) insurance, in an aquaculture business.
	19.04 Discuss the relevance of: (a) property ownership, (b) equipment acquired, (c) equipment repair and maintenance, (d) income and expense, (e) employee time and days, (f) income tax and social security, (g) insurance, in aquaculture business.
	19.05 Manage a production/harvesting system.
	19.06 Complete Supervised Agriculture Experienced (SAE) records.
	19.07 Identify and list functions in the management process.
	19.08 Demonstrate basic bookkeeping skills.
20.0	Demonstrate leadership, employability, communication, networking, and human relations skills. The student will be able to:
	20.01 Demonstrate competence in job-interview techniques.

CTE Standards and Benchmarks	
	20.02 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.
	20.03 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.
	20.04 Demonstrate acceptable employee-hygiene habits.
	20.05 Research information about employment opportunities.
21.0	Produce an aquaculture species in one or more of the following: pond, cage, tank, raceway, net pen. The student will be able to:
	21.01 Identify the types of growing systems and important factors in their selection, design and use.
	21.02 Determine economic factors to consider in choosing a system for commercial production.
	21.03 Identify and describe facility construction and site requirements.
	21.04 Select species for a specific culture facility.
	21.05 Determine feeding methods and calculate feeding rates for an aquaculture organism.
	21.06 Assist in managing water quality in one or more production systems.
	21.07 Maintain and perform repairs on aquaculture machinery, equipment, and facilities.
22.0	Control disease, pest and water quality problems. The student will be able to:
	22.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.
	22.02 Identify major pests of several locally important commercial species and list recommended control methods.
	22.03 Describe methods of prevention, treatment and control of the major diseases and pests previously identified.
	22.04 Identify water quality problems.
	22.05 Determine water quality parameters and describe corrective action where needed.
	22.06 Identify resources for assistance in disease prevention, identification, and treatment.
23.0	Assist in harvesting and processing aquaculture species. The student will be able to:
	23.01 Recognize and observe safety and sanitary practices including biosecurity in harvesting and processing aquaculture organisms.
	23.02 Determine harvesting practices recommended for aquaculture organisms.

CTE Standards and Benchmarks
23.03 Determine equipment, labor, financial and legal requirements for harvesting aquaculture organisms.
23.04 Harvest aquaculture organisms using recommended practices.
23.05 Determine processing and packaging practices recommended for aquaculture organisms.
23.06 Determine equipment, labor, financial and legal requirements for processing and packaging aquaculture organisms.
23.07 Process and/or package aquaculture organisms using recommended practices.
23.08 Compare and contrast methods for shipping aquaculture organisms.

Florida Department of Education
Student Performance Standards

Course Title: **Aquaculture 4**
Course Number: **8112030**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of management and use of water, the propagation and rearing of seed, producing aquaculture species, control of diseases, pests and water quality problems, harvesting and processing, marketing and transportation, management skills and leadership, employability, communication and human relation skills.

CTE Standards and Benchmarks	
24.0	Identify biological components of reptiles, amphibians, and fish. The student will be able to:
24.01	Describe anatomy and physiology of alligators and turtles.
24.02	Describe anatomy and physiology of frogs.
24.03	Describe anatomy and physiology of marine and freshwater baitfish.
24.04	Describe anatomy and physiology of sturgeon.
25.0	Discuss production practices of reptiles, amphibians, and fish. The student will be able to:
25.01	Determine production needs of alligators and turtles.
25.02	Determine production needs of frogs.
25.03	Determine production needs of marine and freshwater baitfish.
25.04	Determine production needs of sturgeon.
26.0	Investigate scientific skills and principles in aquatic plant science. The student will be able to:
26.01	Explain nutrient uptake and photosynthesis in aquatic plants.
26.02	Describe reproductive methods used by aquatic plants.
26.03	Identify commercially important aquatic plants.

CTE Standards and Benchmarks	
27.0	Describe techniques for producing marine ornamentals, clams, oysters, and shrimp. The student will be able to:
27.01	Discuss practices necessary to produce marine ornamentals.
27.02	Discuss practices necessary to produce clams.
27.03	Discuss practices necessary to produce oysters.
27.04	Discuss practices necessary to produce shrimp.
28.0	Manage aquatic animal health. The student will be able to:
28.01	Outline general management measures for preventing disease outbreaks.
28.02	Calculate treatment for aquatic systems.
28.03	Discuss disease resistances.
28.04	Discuss the role of stress in fish diseases.
28.05	Create a biosecurity plan for an aquaculture production facility.
28.06	Develop proper animal husbandry protocols for aquaculture production.
29.0	Determine nutritional needs of aquaculture organisms. The student will be able to:
29.01	Describe dietary requirements needed for aquatic organisms.
29.02	Explain how anatomy and behavior affect feeding.
29.03	Select the appropriate feed for different life stages of aquatic organisms.
29.04	Design a feeding protocol from day one post hatch to mature adult.
30.0	Manage aquaculture systems. The student will be able to:
30.01	Perform routine maintenance on the system.
30.02	Record day to day observations on the system.
30.03	Design standard operating procedures for an aquaculture system.
30.04	Perform water quality checks on aquaculture systems.

CTE Standards and Benchmarks	
	30.05 Design a recirculating system.
31.0	Perform economic practices involved with aquaculture enterprises. The student will be able to.
	31.01 Create a cost analysis for producing an individual species.
	31.02 Determine the cost of installation and operation of an aquaculture system.
	31.03 Calculate a profit and loss analysis of an aquaculture system.
32.0	Participate in classroom extension activities. The student will be able to:
	32.01 Conduct a field experiment or research study on aquaculture topics.
	32.02 Complete a Proficiency Applications research project, or student internship in an aquaculture area.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Equestrian Studies**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8004200
CIP Number	0101030211
Grade Level	9-12
Program Length	5 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	45-2093 -- Farmworkers, Farm, Ranch, and Aquacultural Animals
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agriculture mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to providing technical skill proficiency and includes competency-based applied learning that contributes to the academic knowledge, higher order reasoning and problem solving skills, work attitude, employability skills, technical skills, and knowledge of the equine industry.

This program offers a hands curriculum designed to further students' knowledge of horses and their personal equitation and horsemanship skills. The fundamental purpose is to develop, through a standardized progression of training methods, a horse and riders ability to perform at its maximum potential. A skilled rider should use minimal aids to request a desired movement from the horse while remaining relaxed and creating the illusion of being effortless.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

Program Structure

This program is a planned sequence of instruction consisting of five credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.
The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ
8004210	Introduction to Equestrian Studies	AGRICULTUR 1 @2	1 credit	45-2093	2	CT
8004220	Beginning Equestrian		1 credit	45-2093	2	CT
8004230	Intermediate Equestrian		1 credit	45-2093	2	CT
8004240	Advanced Equestrian		1 credit	45-2093	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Introduction to Equestrian Studies

09.0 Discuss the various types of behavior associated with horses and proper safety procedures.
10.0 Identify and apply proper safety rules and procedures.
11.0 Identify and apply grooming tools, grooming equipment and proper grooming techniques.
12.0 Identify and apply different types of equine tack and equipment.
13.0 Demonstrate the ability to properly mount and dismount a horse.
14.0 Identify and demonstrate the ability to maintain control of the horse while mounted at the walk.
15.0 Identify and demonstrate the ability to maintain control of the horse while mounted at the trot.
16.0 Examine the digestive system of the horse and examine nutritional need.

Beginning Equestrian

17.0 Demonstrate selected competencies in leadership through the FFA and agricultural industry organization, and develops plans for a Supervised Agricultural Experience Program.
18.0 Apply proper safety procedures.
19.0 Identify and apply the organizational structure of the equestrian riding discipline.
20.0 Demonstrate the ability to maintain control of the horse while mounted at the walk.
21.0 Demonstrate the ability to maintain control of the horse while mounted at the trot.
22.0 Identify and demonstrate the ability to properly execute a transition.
23.0 Investigate the sport of equestrian riding and show an understanding of riding the horse forward with a correctly balanced seat.

Intermediate Equestrian

24.0 Discuss the organizational structure of the equestrian riding discipline.
25.0 Determine the ability to maintain control of the horse while mounted at the walk.
26.0 Determine the ability to maintain control of the horse while mounted at the trot.
27.0 Demonstrate the ability to properly execute a transition.
28.0 Explore the sport of equestrian riding and show an understanding of riding the horse forward with a correctly balanced seat.

29.0 Demonstrate proper preparation, grooming and exhibition of a horse.

Advanced Equestrian

30.0 Analyze the importance of safety procedures.
31.0 Apply the organizational structure of the equestrian riding discipline.
32.0 Exhibit the ability to maintain control of the horse while mounted at the walk.
33.0 Exhibit the ability to maintain control of the horse while mounted at the trot.
34.0 Exhibit the ability to maintain control of the horse while mounted at the canter.
35.0 Exhibit the ability to properly execute a transition.
36.0 Show the ability of riding the horse forward with a correctly balanced seat.
37.0 Prepare, groom and exhibit a horse.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Equestrian Studies**
Course Number: **8004210**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of leadership, equine history and domestication, equine breeds and characteristics, anatomy, behavior, safety, grooming, handling and equitation skills with horses.

CTE Standards and Benchmarks	
09.0	Discuss the various types of behavior associated with horses and proper safety procedures. The student will be able to:
09.01	Name and describe behavioral categories associated with horses.
09.02	Investigate the sense of vision, touch, smell and hearing of the horse.
09.03	Predict how natural behavior is used to train a horse.
10.0	Identify and apply proper safety rules and procedures. The student will be able to:
10.01	Demonstrate and apply proper safety rules when handling and haltering horses.
10.02	Identify proper safety rules for various situations.
10.03	Identify proper clothing that should be worn when working with horses.
11.0	Identify and apply grooming tools, grooming equipment and proper grooming techniques. The student will be able to:
11.01	Identify grooming tools and equipment.
11.02	Explain the use of grooming tools and equipment.
11.03	Demonstrate proper grooming techniques and procedures.
11.04	Understand the goals and purpose of grooming.
12.0	Identify and apply different types of equine tack and equipment. The student will be able to:
12.01	Identify common bridle parts and their purpose.

CTE Standards and Benchmarks	
	12.02 Identify common saddle parts and their purpose.
	12.03 Identify common equine equipment.
	12.04 Identify and demonstrate proper bridling procedures.
	12.05 Identify and demonstrate proper saddling procedures.
	12.06 Maintain equine tack and equipment.
13.0	Demonstrate the ability to properly mount and dismount a horse. The student will be able to:
	13.01 Identify and apply the proper procedure for mounting a horse.
	13.02 Identify and apply the proper procedure for dismounting a horse.
	13.03 Identify and demonstrate adjusting stirrup length specific to rider.
	13.04 Complete a tack check prior to mounting.
14.0	Identify and demonstrate the ability to maintain control of the horse while mounted at the walk. The student will be able to:
	14.01 Apply correct rider position and seat including alignment, posture and stability at all times.
	14.02 Demonstrate correct rider form and position.
	14.03 Demonstrate correct rider form and position to encourage forward movement.
	14.04 Demonstrate an emergency stop.
	14.05 Demonstrate proper maneuvering techniques and procedures; including reversing, backing, and turning.
15.0	Identify and demonstrate the ability to maintain control of the horse while mounted at the trot. The student will be able to:
	15.01 Apply correct rider position and seat including alignment, posture and stability at all times.
	15.02 Demonstrate correct rider form and position to encourage forward movement.
	15.03 Demonstrate an emergency stop.
	15.04 Demonstrate proper maneuvering techniques and procedures; including reversing and turning.
	15.05 Demonstrate the proper technique of sitting the trot.

CTE Standards and Benchmarks	
	15.06 Identify the actions of a posting trot.
16.0	Examine the digestive system of the horse and examine nutritional needs. The student will be able to:
	16.01 Compare between simple stomach, ruminant and the cecum digestive systems.
	16.02 Investigate the function of the small and large intestine and the roles these parts play in the digestive process.
	16.03 Distinguish between the function of nutrients within the body.
	16.04 Identify and explain common feed stuffs incorporated in equine diets.

Florida Department of Education
Student Performance Standards

Course Title: **Beginning Equestrian**
Course Number: **8004220**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of leadership, equine safety procedures, the organizational structure of the equestrian riding discipline, and maintaining control of the horse at all times while mounted.

CTE Standards and Benchmarks	
17.0	Demonstrate selected competencies in leadership through the FFA and agricultural industry organization, and develops plans for a Supervised Agricultural Experience Program. The student will be able to:
	17.01 Explore professional equine organizations.
	17.02 Explore career opportunities in equine businesses through the FFA and Agricultural Education program.
	17.03 Develop leadership and personal development skills through Career Development Event participation in the FFA.
18.0	Apply proper safety procedures. The student will be able to:
	18.01 Demonstrate and apply proper safety rules and procedures when working with horses.
	18.02 Wear proper clothing when working with horses.
19.0	Identify and apply the organizational structure of the equestrian riding discipline. The student will be able to:
	19.01 Identify and describe the correct measurements within an equestrian riding arena.
	19.02 Describe the proper letter placement around an equestrian riding arena.
	19.03 Explain the organizational outline of test and patterns available in equestrian riding.
	19.04 Illustrate the proper terminology that accompanies the equestrian riding discipline.
20.0	Demonstrate the ability to maintain control of the horse while mounted at the walk. The student will be able to:
	20.01 Apply correct rider position and seat including body alignment, posture and stability at all times while walking.
	20.02 Identify and demonstrate the proper procedures for a free walk.

CTE Standards and Benchmarks	
	20.03 Maintain the desired gait.
21.0	Demonstrate the ability to maintain control of the horse while mounted at the trot. The student will be able to:
	21.01 Apply correct rider position and seat including body alignment, posture and stability at all times while trotting.
	21.02 Demonstrate a posting trot.
	21.03 Identify and demonstrate the ability to properly pick up the correct posting diagonal.
	21.04 Demonstrate the gait of trotting with a clear rhythm.
22.0	Identify and demonstrate the ability to properly execute a transition. The student will be able to:
	22.01 Properly demonstrate transitions (walk to halt, trot to halt, walk to trot, trot to walk).
	22.02 Properly prepare and balance horse to execute a transition.
23.0	Investigate the sport of equestrian riding and show an understanding of riding the horse forward with a correctly balanced seat. The student will be able to:
	23.01 Identify and demonstrate the ability to maneuver the horse on a straight line
	23.02 Identify and demonstrate the ability to maneuver the horse correctly around the equestrian riding arena and through corners.
	23.03 Identify and demonstrate the completion of a 20-meter circle.
	23.04 Identify and demonstrate the ability to navigate the horse on a diagonal.
	23.05 Demonstrate selected competencies in leadership through the FFA and agricultural industry organization, and develops plans for a Supervised Agricultural Experience Program.

Florida Department of Education
Student Performance Standards

Course Title: **Intermediate Equestrian**
Course Number: **8004230**
Course Credit: **1**

Course Description:

To introduce the horse and rider team to the sport of equestrian riding and to show understanding of riding the horse forward with steady hands and a correctly positioned seat.

CTE Standards and Benchmarks	
24.0	Discuss the organizational structure of the equestrian riding discipline. The student will be able to:
24.01	Apply the correct measurements of the equestrian riding arena while maneuvering through an equestrian riding pattern.
24.02	Understand and apply the proper letter placement around an equestrian riding arena and properly navigate an equestrian riding pattern.
24.03	Understand the organizational outline of patterns and test available in equestrian riding.
24.04	Illustrate the proper terminology that accompanies the equestrian riding discipline.
25.0	Determine the ability to maintain control of the horse while mounted at the walk. The student will be able to:
25.01	Demonstrate the correct procedures for a free walk.
25.02	Identify and demonstrate the horse’s proper equestrian riding head carriage while walking.
25.03	Maintain the desired gait while walking (Medium walk or free walk).
26.0	Determine the ability to maintain control of the horse while mounted at the trot. The student will be able to:
26.01	Demonstrate a posting trot while maintaining the correct posting diagonal.
26.02	Demonstrate the gait of the trot with clear rhythm and balance.
26.03	Demonstrate the gait of the trot while maintaining the horse’s proper equestrian riding head carriage.
27.0	Demonstrate the ability to properly execute a transition. The student will be able to:
27.01	Properly exhibit transitions (walk to halt, walk to trot, trot to walk and trot to halt).

CTE Standards and Benchmarks	
	27.02 Properly prepare and balance a horse to execute a transition in the given time allotment.
28.0	Explore the sport of equestrian riding and show an understanding of riding the horse forward with a correctly balanced seat. The student will be able to:
	28.01 Demonstrate the ability to maneuver the horse on a straight line, including the long-sides and center line of the equestrian riding arena.
	28.02 Demonstrate the ability to maneuver the horse correctly around the equestrian riding arena including through corners, long-sides, center lines and circles.
	28.03 Demonstrate the completion of a 20-meter circle in all areas of the arena.
	28.04 Demonstrate the ability to navigate the horse on a diagonal at a trot, walk or free walk.
29.0	Demonstrate proper preparation, grooming and exhibition of a horse. The student will be able to:
	29.01 Properly groom a horse to prepare for show
	29.02 Properly braid a horse according to equestrian riding standards for show.
	29.03 Exhibit and train a horse for show.

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Equestrian**
Course Number: **8004240**
Course Credit: **1**

Course Description:

To continue training in the sport of equestrian riding with particular attention to maintaining a steady tempo, elastic contact with the horse, proper geometry of figures and corners, and moving freely forward with a clear rhythm and direct contact with the bit.

CTE Standards and Benchmarks	
30.0	Analyze the importance of safety procedures. The student will be able to:
30.01	Apply proper safety rules and procedures when working with and around horses.
30.02	Describe the importance of wearing proper clothing when working with and around horses.
31.0	Apply the organizational structure of the equestrian riding discipline. The student will be able to:
31.01	Apply the correct measurements of the equestrian riding arena while maneuvering through an equestrian riding pattern.
31.02	Apply the proper letter placement around an equestrian riding arena and properly navigate an equestrian riding pattern.
31.03	Understand the organizational outline of patterns and test available in equestrian riding.
31.04	Illustrate the proper terminology that accompanies the equestrian riding discipline.
32.0	Exhibit the ability to maintain control of the horse while mounted at the walk. The student will be able to:
32.01	Demonstrate and apply the correct procedures for a free walk including freedom to stretch neck forward and downward and proper ground cover.
32.02	Demonstrate the horse’s proper equestrian riding head carriage while walking.
33.0	Exhibit the ability to maintain control of the horse while mounted at the trot. The student will be able to:
33.01	Exhibit correct rider position and seat including body alignment, posture and stability at all times while trotting.
33.02	Demonstrate the ability to execute the gait of an extended trot.
33.03	Demonstrate the ability to execute a 15-meter circle at a trot.

CTE Standards and Benchmarks	
34.0	Exhibit the ability to maintain control of the horse while mounted at the canter. The student will be able to:
34.01	Apply correct rider position and seat including body alignment, posture and stability at all times while cantering.
34.02	Identify / demonstrate the ability to cue the horse for the correct canter lead.
34.03	Identify / demonstrate the ability to maneuver the horse on a straight line while cantering.
34.04	Identify / demonstrate the ability to maneuver the horse on a 20-meter circle while cantering.
34.05	Identify / demonstrate the ability to maneuver the horse through a corner in the equestrian riding arena.
35.0	Exhibit the ability to properly execute a transition. The student will be able to:
35.01	Demonstrate a straight, attentive immobile halt for a minimum of 3 seconds.
36.0	Show the ability of riding the horse forward with a correctly balanced seat. The student will be able to:
36.01	Demonstrate the ability to maneuver the horse on a straight line, including the long-sides and center line of the equestrian riding arena at the walk, trot and canter.
36.02	Demonstrate the ability to maneuver the horse correctly around the equestrian riding arena including through corners, long-sides, center lines and circles at the walk, trot and canter.
36.03	Demonstrate impulsion, the desire to encourage the horse to move forward with suppleness in the back and engagement of the hindquarters.
36.04	Demonstrate submission, cooperation and harmony with the horse, acceptance of the bit and ease of movements.
36.05	Demonstrate freedom and regularity of the desired gaits performed.
37.0	Prepare, groom and exhibit a horse. The student will be able to:
37.01	Train a horse for show or exhibition.
37.02	Describe and demonstrate methods of restraining, loading, handling and transporting horses.
37.03	Identify components of health certificates, and coggins test paperwork.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org .

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Equine Science**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food & Natural Resources**

Secondary – Career Preparatory	
Program Number	8004300
CIP Number	0101050704
Grade Level	9-12
Program Length	4 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	39-2021 – Animal Caretakers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food & Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food & Natural Resources career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTURE 7 G AGRICULTUR 1 @2	1 credit	39-2021	3	EQ
8004310	Equine Science 2	AGRICULTUR 1 @2	1 credit	39-2021	2	CT
8004320	Equine Science 3		1 credit	39-2021	2	CT
8004330	Equine Science 4		1 credit	39-2021	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Equine Science 2

09.0 Describe equine science and the roles of horses in society.
10.0 Classify and describe equine according to hierarchical taxonomy, breeds, and classification of horses in society.
11.0 Describe equine and human first aid and laboratory safety.
12.0 Recognize and discuss normal and abnormal equine behaviors.
13.0 Demonstrate safe handling of equine and management techniques.
14.0 Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques.
15.0 Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques.
16.0 Evaluate and implement the steps and requirements to pursue a career opportunity in the equine industry.
17.0 Evaluate the importance of the equine science industry in order to understand the impact on the global economy.
18.0 Analyze the U.S. and community's responsibility in options for caring for unwanted/neglected livestock and horses.
19.0 Identify, describe and select animals for specific purposes, and performance based on anatomy and physiology.
20.0 Identify and perform simple health – check evaluations on animals and equine.
21.0 Identify principles of comparative anatomy and physiology within the various systems of equine.

Equine Science 3

22.0 Practice agriscience safety skills and procedures.
23.0 Demonstrate safe handling of equine and management techniques.
24.0 Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques.
25.0 Analyze feed rations, additives, and supplements, and asses how they meet the nutritional needs of animals.
26.0 Explain the reproductive system and be able to evaluate horses for breeding readiness and soundness.
27.0 Identify and understand the breeding of selected equine animals.
28.0 Evaluate horses for selection and evaluation purposes.
29.0 Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level.
30.0 Design programs to prevent equine diseases, parasites, and other disorders and to ensure animal welfare.
31.0 Apply leadership and citizenship skills.

32.0 Maintain and analyze records.

Equine Science 4

33.0 Apply proper safety procedures.
34.0 Investigate emerging technologies in Equine Science.
35.0 Analyze equine nutrient requirements and diets.
36.0 Maintain programs to prevent equine diseases, parasites and other disorders and ensure animal welfare.
37.0 Apply scientific principles in the selection and breeding of equine.
38.0 Identify and demonstrate employability skills in the equine industry.
39.0 Identify and understand the different types of equine specialties pertaining to their equine industry focus area.
40.0 Identify equine industry sectors and business opportunities in the industry.
41.0 Maintain and analyze records.
42.0 Apply leadership and citizenship skills.
43.0 Manage pasture and forage crops.
44.0 Understand the relationship of animal production and the environment.
45.0 Maintain equipment and facilities.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Equine Science 2**
Course Number: **8004310**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of equine safety, safe handling, equine behavior, breeds of horses, classification of equine, grooming, health checks, digestion and nutritional requirements, anatomy and physiology, body systems, global impact and governing agencies in equine and careers in the equine industry.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
09.0	Describe equine science and the roles of horses in society. The student will be able to
09.01	Describe equine science and the roles of horses in society.
09.02	Analyze public perceptions of opinions of equine and animal related issues.
09.03	Outline and identify the development of the equine industry and resulting products of services and careers.
09.04	Understand and predict trends and implications of future developments of the equine industries (including status and statistics).
10.0	Classify and describe equine according to hierarchical taxonomy, breeds, and classification of horses in society. The student will be able to:
10.01	Analyze the visual characteristics of equine; understand domestication and taxonomical classification terminology when referring to companion, production, and showing equine.
10.02	Understand evolution and the role horses have played in history and cultural development.
10.03	Appraise and evaluate the economic value of horses used for various applications in the equine industry.
10.04	Identify breeds of horses; describe types and classes of how equine are classified according to their use.
11.0	Describe equine and human first aid and laboratory safety. The student will be able to:

CTE Standards and Benchmarks	
	11.01 Practice safe procedures when working with animals (equine) and related equipment and in laboratory settings.
	11.02 Discuss the impact of safe and unsafe procedures.
	11.03 Explain how to use a first aid kit and its key components.
	11.04 Explain emergency procedures and understand how to control minor hemorrhage and/or trauma.
12.0	Recognize and discuss normal and abnormal equine behaviors. The student will be able to:
	12.01 Distinguish between instinctive, learned, and negative behaviors of livestock and equine.
	12.02 Recognize normal and abnormal behavior characteristics of equine through observations and handling.
	12.03 Identify behavior problems in equine and possible remedies.
	12.04 Identify and recognize the flight or fight response in horses.
13.0	Demonstrate safe handling of equine and management techniques. The student will be able to:
	13.01 Demonstrate and apply proper safety rules and precautions when handling and haltering horses.
	13.02 Identify proper safety rules and procedures for various situations around equine.
	13.03 Safely catch, lead, tie, groom, and work around horses of various levels.
14.0	Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques. The student will be able to:
	14.01 Identify and explain the use of grooming tools and equipment.
	14.02 Explain and understand the goals and purpose of grooming.
	14.03 Demonstrate proper grooming techniques and procedures.
15.0	Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques. The student will be able to:
	15.01 Compare and contrast the digestive systems of equine and other livestock animals.
	15.02 Investigate the function of the small and large intestine and the roles these parts play in the digestive process.
	15.03 Identify and distinguish between the function of essential nutrients needed in the body.
	15.04 Identify, explain, and compare/contrast common feed stuffs incorporated in equine diets.

CTE Standards and Benchmarks	
	15.05 Discuss the relative nutritional value of feedstuffs by evaluating their general quality and condition.
	15.06 Analyze and know how to read and understand feed labels and apply feed label regulations.
16.0	Evaluate and implement the steps and requirements to pursue a career opportunity in the equine industry. The student will be able to:
	16.01 Locate, obtain, and research information on equine-industry careers and career opportunities.
	16.02 Examine the educational training and experiential requirements to pursue a career in the equine industry.
	16.03 Examine professional organizations and groups in the equine industry and supporting organizations.
	16.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.
	16.05 Prepare and maintain Supervised Agricultural Experience (SAE) records.
17.0	Evaluate the importance of the equine science industry in order to understand the impact on the global economy. The student will be able to:
	17.01 Investigate local, state, and national regulatory laws, industry regulations, and legislation for equine and agriculture businesses.
	17.02 Identify and describe the primary government agencies involved with equine and agriculture businesses.
18.0	Analyze the U.S. and community's responsibility in options for caring for unwanted/neglected livestock and horses. The student will be able to:
	18.01 Differentiate between animal control agencies, humane societies, and equine agencies.
	18.02 Explain the laws governing animal care, livestock, equine and their uses.
19.0	Identify, describe and select animals for specific purposes, and performance based on anatomy and physiology. The student will be able to:
	19.01 Identify and describe anatomy and physiology of a horse.
	19.02 Identify and describe common coat colors of a horse.
	19.03 Identify facial and leg markings of a horse.
	19.04 Compare and contrast desirable anatomical and physiological characteristics of equine among different uses and breeds (gaits and movement).
20.0	Identify and perform simple health – check evaluations on animals and equine. The student will be able to:
	20.01 Identify and perform simple health checks on equine and livestock animals to detect illness, injury, or other problems.

CTE Standards and Benchmarks	
	20.02 Examine, identify and perform vital sign checks that indicate normal vs cautious and dangerous levels.
21.0	Identify principles of comparative anatomy and physiology within the various systems of equine. The student will be able to:
	21.01 Identify parts, major organs, and functions, of the following systems of animals using correct terminology: cells, tissues, and organs.
	21.02 Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton.
	21.03 Identify the general function of the nervous system and the major organs.
	21.04 Identify the general function of the muscular system and major groups of muscles.
	21.05 Identify the general function of the digestive system; differentiate between ruminants and non-ruminants (monogastric and hind gut fermenters) and the major organs.
	21.06 Identify the general function of the respiratory system and the major organs.
	21.07 Identify the general function of the urinary system and the major organs.
	21.08 Identify the general function of the circulatory system and the major organs.

Florida Department of Education
Student Performance Standards

Course Title: Equine Science 3
Course Number: 8004320
Course Credit: 1

Course Description:

This course is designed to develop competencies in the areas of equine safety, safe handling of horses, proper grooming and equipment, equine health and care, digestion and nutritional requirements, equine evaluation factors, breeding readiness and decision making, biosecurity, parasites and diseases, leadership, maintaining and analyzing records in the equine industry.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
22.0	Practice agriscience safety skills and procedures. The student will be able to:
22.01	Identify the common causes and preventions of accidents in equine operations.
22.02	Be able to extract and utilize pertinent information from a container label or Safety Data Sheet.
23.0	Demonstrate safe handling of equine and management techniques. The student will be able to:
23.01	Demonstrate and apply proper safety rules and precautions when handling and haltering horses, mares, and foals.
23.02	Identify proper safety rules and procedures for various situations around halter breaking and desensitizing horses to an environment.
23.03	Safely catch, lead, tie, groom, and work around horses of various levels.
23.04	Evaluate safe transportation techniques and equipment for transportation of equine.
23.05	Identify and be able to explain and read proper paperwork required for transporting or taking equine to other facilities.
24.0	Identify and apply how to use grooming tools, grooming equipment, and proper grooming techniques. The student will be able to:
24.01	Demonstrate proper preparation, grooming, brushing and caring of equine.

CTE Standards and Benchmarks	
	24.02 Demonstrate the ability to bathe a horse using industry approved standards.
	24.03 Be able to identify different types of equipment used in the equine industry (types of halters, types of saddles, equipment, etc.)
25.0	Analyze feed rations, additives, and supplements, and asses how they meet the nutritional needs of animals. The student will be able to:
	25.01 Compare and contrast common types of feedstuffs and the roles they play in the diets of equine.
	25.02 Discuss the relative nutritional value of feedstuffs by evaluating their general quality and condition.
	25.03 Select appropriate feedstuffs for equine based on factors such as economics, digestive system, nutritional needs, and performance methods.
	25.04 Examine the importance of a balanced ration for horses based on their growth stage of development (maintenance, newborn, gestation, lactation) and/or performance method and use.
	25.05 Practice and apply how to read and understand feed labels to specific diets of equine.
26.0	Explain the reproductive system and be able to evaluate horses for breeding readiness and soundness. The student will be able to:
	26.01 Explain how age, size, life cycle, maturity level and health status affect the reproductive efficiency of male and female horses (hormones, ovulation, heat cycle).
	26.02 Explain and identify the reproductive anatomy/physiology of male and female horses.
	26.03 Assess and describe factors that lead to reproductive maturity.
	26.04 Evaluate and select horses for reproductive readiness.
	26.05 Summarize the importance of efficient and economic reproduction in equine.
	26.06 Identify reproductive problems that occur in horses.
	26.07 Determine when to treat or cull horses with reproductive problems.
27.0	Identify and understand the breeding of selected equine animals. The student will be able to:
	27.01 Identify and demonstrate how to read a pedigree and understand them.
	27.02 Identify phenotypically superior breeding in the horse industry.
	27.03 Describe breeding techniques for different types of equine industries.
28.0	Evaluate horses for selection and evaluation purposes. The student will be able to:

CTE Standards and Benchmarks	
	28.01 Evaluate equine conformation factors according to their breed, use and purpose in the industry.
	28.02 Identify, describe, and practice using evaluation factors according to proper equine standards.
	28.03 Identify and describe breeds of horses using evaluation factors according to approved breed standards.
	28.04 Identify and describe the proper and improper gaits of equine.
	28.05 Identify and describe unsoundness and blemishes in equine.
29.0	Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level. The student will be able to:
	29.01 Identify, describe, and summarize the importance of biosecurity to the equine industry at multiple levels (local, state, national, global).
	29.02 Identify, describe, and analyze zoonotic diseases, including their historical significance and potential future implications.
	29.03 Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.
30.0	Design programs to prevent equine diseases, parasites, and other disorders and to ensure animal welfare. The student will be able to:
	30.01 Explain methods of determining animal health and disorders.
	30.02 Perform simple health-check evaluations on equine and practice basic emergency response procedures related to them.
	30.03 Identify and understand the body condition scoring system in equine.
	30.04 Identify and describe common illnesses and disorders of equine based on symptoms and problems caused by wounds, diseases, parasites, and physiological disorders.
	30.05 Identify and summarize characteristics of causal agents and vectors of diseases and disorders in equine.
	30.06 Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites, and disorders among equine.
31.0	Apply leadership and citizenship skills. The student will be able to:
	31.01 Identify and describe leadership characteristics in the FFA organization and equine opportunities.
	31.02 Demonstrate the ability to work cooperatively.
	31.03 Identify and participate in community-based learning activities and be able to demonstrate how to be an active citizen.
32.0	Maintain and analyze records. The student will be able to:

CTE Standards and Benchmarks
32.01 Discuss, identify, and maintain the legal requirements of maintaining good animal health records.
32.02 Identify and maintain records of equine on school campus.
32.03 Prepare and maintain Supervised Agricultural Experience (SAE) records.

Florida Department of Education
Student Performance Standards

Course Title: **Equine Science 4**
Course Number: **8004330**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of equine safety, safe handling of horses, emerging technologies in equine, nutritional requirements and feeding programs, selection and breeding programs, equine diseases and parasites, employability skills, equine sectors and business opportunities, leadership, managing pasture and forage crops, best management practices in the environment, maintaining and analyzing records, maintaining equipment and facilities.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
33.0	Apply proper safety procedures. The student will be able to:
33.01	Demonstrate and apply proper safety rules and procedures when working with horses.
33.02	Demonstrate and apply proper safety rules and precautions when handling and working with horses, mares, and foals.
33.03	Wear proper clothing when working with horses and livestock.
34.0	Investigate emerging technologies in Equine Science. The student will be able to:
34.01	Identify new technologies in the equine industry.
34.02	Research emerging technologies and determine their impact on the equine industry and society.
34.03	Research and identify different types of therapies that can be used in the equine industry.
35.0	Analyze equine nutrient requirements and diets. The student will be able to:
35.01	Maintain safe feeding management programs for enhanced equine health.
35.02	Prepare and formulate a typical diet for different classes of horses (maintain, growth, work, lactation, performance methods).

CTE Standards and Benchmarks	
36.0	Maintain programs to prevent equine diseases, parasites and other disorders and ensure animal welfare. The student will be able to:
36.01	Explain and maintain methods of determining animal health and disorders.
36.02	Perform simple health-check evaluations on equine and practice basic emergency response procedures related to them.
36.03	Identify and describe common illnesses and disorders of equine based on symptoms and problems caused by wounds, diseases, parasites and physiological disorders.
36.04	Identify, explain, and describe how internal and external parasites affect the equine industry (life cycle and treatment plan).
36.05	Develop, design, and maintain a health care program for equine, including vaccination protocols, deworming schedules, biosecurity, and first aid.
37.0	Apply scientific principles in the selection and breeding of equine. The student will be able to:
37.01	Identify and summarize the advantages and disadvantages of major reproductive management practices, including estrous synchronization, superovulation, flushing, and embryo transfer (e.g., cost, labor, equipment, etc.).
37.02	Analyze the processes of major reproductive management practices, including estrus, synchronization, superovulation, flushing, and embryo transfer.
37.03	Create and evaluate plans and procedures for estrous synchronization, superovulation, flushing, embryo transfer, and other reproductive management practices.
37.04	Calculate the potential economic benefits of natural breeding versus artificial breeding methods.
37.05	Analyze the materials, methods, and processes of artificial insemination.
37.06	Identify and explain the proper care, management, and collection of a stallion.
37.07	Identify and explain the proper care of a mare (gestation) and the stages of foaling.
37.08	Describe the proper care for a newborn foal during different stages of the growth process.
38.0	Identify and demonstrate employability skills in the equine industry. The student will be able to:
38.01	Demonstrate punctuality, courtesy, dependability, flexibility, and honesty.
38.02	Demonstrate the ability to work as a part of a team.
38.03	Prepare a resume, cover letter, and practice interview techniques.
39.0	Identify and understand the different types of equine specialties pertaining to their equine industry focus area.
39.01	Identify and understand the importance of different stages of the race horse/thoroughbred industry (commercial breeders, foaling, weanling to yearling, pin hooking, two-year sales, racing, training).

CTE Standards and Benchmarks	
	39.02 Identify and understand the importance of sales prepping thoroughbreds and other breeds of economic importance in our area.
	39.03 Identify and understand the importance of marketing thoroughbreds and other breeds of economic importance in our area.
	39.04 Handle proficiently equines of different breeds and various levels, including foal, weanling, yearling, two-year old, and racehorse.
40.0	Identify equine industry sectors and business opportunities in the industry.
	40.01 Develop and understand critical issues in the horse industry, such as legislative, regulatory, and ethical.
	40.02 Identify business opportunities in various equine sectors by evaluating markets and profit potential.
	40.03 Identify and describe the five basic ways American businesses are organized.
	40.04 Identify and explain business aspects needed in the industry (cost, balance sheet, statements, credit, taxes, marketing, contracts, insurance).
	40.05 Identify and develop a business plan for a typical equine business in the industry.
41.0	Maintain and analyze records. The student will be able to:
	41.01 Discuss, identify, and maintain good animal health records.
	41.02 Identify and maintain records of equine in different types of equine industries.
	41.03 Identify and maintain types of farm inventory for equine facilities (horse, feed, equipment) for optimum efficiency and profitability.
	41.04 Prepare and maintain Supervised Agricultural Experience (SAE) records.
42.0	Apply leadership and citizenship skills. The student will be able to:
	42.01 Identify and describe leadership characteristics in the FFA organization and equine industries.
	42.02 Demonstrate the ability to work as a team and cooperatively.
43.0	Manage pasture and forage crops. The student will be able to:
	43.01 Compare types and qualities of forages, pasture, and hay production for equine operations.
	43.02 Determine range and pasture quality; assist in determining pasture and forage needs.
	43.03 Take a forage sample and interpret results.
	43.04 Assist in the development of a plan for the rotation of fields, pens, and pastures.

CTE Standards and Benchmarks	
44.0	Understand the relationship of animal production and the environment. The student will be able to:
44.01	Evaluate the relationship between equine/animal agriculture and environment.
44.02	Describe BMPs (Best Management Practices) to balance the impact of equine and animal agriculture on the environment.
44.03	Determine positive effects of animal agriculture on the environment.
45.0	Maintain equipment and facilities. The student will be able to:
45.01	Clean and disinfect pens, feeders, waterers, trailers, and other equipment according to Best Management Practices.
45.02	Dispose of animal residue and waste according to Best Management Practices.
45.03	Prepare, create, and maintain equipment, instruments, and pastures.
45.04	Design a facility that meets standards for the legal, safe, ethical, and efficient production of equine.
45.05	Create and maintain a clean, sanitary, and healthy environment for equine.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Technical Agriculture Operations**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8005100
CIP Number	0101020500
Grade Level	9-12
Program Length	5 credits
Teacher Certification	Refer to the **Program Structure** section
CTSO	FFA
SOC Codes (all applicable)	49-3041 -- Farm Equipment Mechanics and Service Technicians 45-2091 -- Agricultural Equipment Operators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the agriculture mechanics industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to mechanical operations, welding, small engine maintenance and repair, planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five credits. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ
8005110	Technical Agriculture Operations 2	AGRICULTUR 1 @2 AGRI MECH #7	1 credit	49-3041	2	CT
8005120	Technical Agriculture Operations 3		1 credit	49-3041	2	CT
8005130	Technical Agriculture Operations 4		1 credit	49-3041	2	CT
8005140	Technical Agriculture Operations 5		1 credit	49-3041	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Technical Agriculture Operations 2

09.0 Practice personal, equipment, and shop safety.
10.0 Select and use hand and power tools.
11.0 Plan, draw, and construct a project.
12.0 Install simple electrical circuits.
13.0 Perform basic plumbing and irrigation procedures.
14.0 Evaluate the importance of the food and fiber system to understand the impact on global economy.
15.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.
16.0 Demonstrate employability skills.
17.0 Demonstrate welding skills.

Technical Agriculture Operations 3:

18.0 Service and maintain small gasoline engines.
19.0 Perform preventative maintenance, checks, and services for agricultural equipment.
20.0 Design and maintain an irrigation system.
21.0 Explain the components of the American business system.
22.0 Investigate agricultural cooperatives structure and function.
23.0 Mix and pour concrete and use masonry materials.
24.0 Construct and maintain agricultural structures**.**

Technical Agriculture Operations 4:

25.0 Keep records.
26.0 Weld, braze, and cut, using appropriate equipment.
27.0 Operate, service, test, and maintain agricultural machinery and equipment**.**
28.0 Discuss the role of refrigeration in agriculture.
29.0 Demonstrate knowledge of new and emerging technologies in agriculture.

Technical Agriculture Operations 5

30.0 Diagnose, service, and repair the lubrication system.
31.0 Test, repair and/or replace, and maintain the cooling system.
32.0 Test, repair and/or replace the intake, exhaust, and turbo-charged systems.
33.0 Test, repair and/or replace the fuel-delivery system, using service manuals.
34.0 Test, repair and/or replace, and maintain the brake system.
35.0 Diagnose, service, repair, and maintain the hydraulic system.
36.0 Diagnose, service, and repair transmission systems.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Technical Agriculture Operations 2**
Course Number: **8005110**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of safety; selection and use of tools; planning and building projects and construction of agricultural structures, including the use of electrical circuits, plumbing, concrete and masonry; and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Practice personal, equipment, and shop safety. The student will be able to:	
09.01	Identify and eliminate hazards in agricultural mechanics settings.	
09.02	Observe color-coded warnings in work areas and on equipment and machinery. (Example Red= Danger, Orange = Warning, Yellow =Caution, Blue = Information, Green = Safety)	
09.03	Describe appropriate actions in case of fire, accident, or other emergencies.	CS.07.03.01.b
09.04	Describe personal protective equipment (PPE) and appropriate clothing. (Clothing, closed toe shoes Eye wear, and hearing protection)	CS.06.02.01.a
09.05	Demonstrate safety procedures and workplace "housekeeping" practices.	CS.06.03.01.a
09.06	Safely handle and store flammable and non-restricted chemicals.	CS.07.04.02.a
09.07	Interpret the equipment instructions according to the operator’s manuals for equipment.	CS.08.01.02.a
09.08	Comply with the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) rules and regulations within ag shop.	CS.07.04.01.a
09.09	Describe the Florida "Right-to-Know" law (as recorded in Florida Statutes, Chapter 442).	CS.07.04.01.a
10.0	Select and use hand and power tools. The student will be able to:	
10.01	Identify the capabilities and limitations of hand and power tools.	
10.02	Select and safely use hand and power tools.	CS.08.01.01.c CS.08.01.02.a
10.03	Select and use proper PPE for hand and power tools.	CS.06.02.01.a

CTE Standards and Benchmarks		National Standards
10.04	Identify worn, damaged, or abused tools and repair.	
10.05	Select and demonstrate the appropriate procedures for sharpening tools. (Such as chisel, axe, shovel, and knife)	
10.06	Demonstrate the use of measurement tools common to agriculture.	
11.0	Plan, draw, and construct a project. The student will be able to:	
11.01	Plan, draw, and construct a 2 or 3 dimensional project.	
11.02	Design and draw a project using drawing instruments and/or computer-assisted design (CAD) software.	
11.03	Calculate a bill of materials to aid in planning, development, and marketing of projects.	
11.04	Construct a project (woodworking, metal working, PVC).	
11.05	Identify and select appropriate finishes (such as paint, varnish, and stain) to facilitate a creative process using color mixing skills if applicable.	
12.0	Install simple electrical circuits. The student will be able to:	
12.01	Demonstrate appropriate safety precautions and equipment	
12.02	Explain the principles of AC and DC circuitry.	PST.03.04.02.a
12.03	Explain series and parallel circuitry.	PST.03.04.01.b
12.04	Explain the scientific principles of electrical systems.	
12.05	Plan and install a simple wiring circuit.	PST.03.04.01.b
12.06	Test electrical circuits using a multi-test meter.	
12.07	Identify and describe the use and function of sensors in Agriculture	
13.0	Perform basic plumbing and irrigation procedures. The student will be able to:	
13.01	Demonstrate appropriate safety precautions and equipment	
13.02	Identify and select plumbing and irrigation materials and tools.	
13.03	Plan and construct a simple water-delivery system.	
13.04	Troubleshoot and perform minor plumbing and irrigation repairs.	PST.04.04.01.b

CTE Standards and Benchmarks		National Standards
	13.05 Locate the state and local codes and standards and describe the importance of complying with them.	PST.04.02.03.b
14.0	Evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:	
	14.01 Assess the agricultural impact upon the US gross national product and the total global economy.	CS.09.01.01.c
	14.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.	
	14.03 Identify and describe the primary government agencies involved with agriculture.	
	14.04 Research new and emerging technologies and their impact on the economy.	CS.10.02.01.b
	14.05 Recognize the value of the food and agribusiness industry.	
15.0	Examine the scope of career opportunities in and the importance of agriculture to the economy. The student will be able to:	
	15.01 Explore agriculture and agribusinesses and their role in the economy.	
	15.02 Evaluate and explore the agribusiness career opportunities in agriculture.	
	15.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.	
	15.04 Demonstrate those qualities, attributes, and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.	
16.0	Demonstrate employability skills. The student will be able to:	
	16.01 Conduct group meetings, using parliamentary procedures and public-speaking skills.	
	16.02 Identify the documents that are required for a job application.	
	16.03 Complete a job application form.	
	16.04 Demonstrate competencies in job-interview techniques.	
17.0	Demonstrate welding skills. The student will be able to:	
	17.01 Demonstrate appropriate safety precautions and equipment.	
	17.02 Select and use gas to complete a weld.	PST.04.04.07.b PST.04.04.07.c
	17.03 Select and use electric arc to complete a weld.	PST.04.04.07.b PST.04.04.07.c

CTE Standards and Benchmarks	National Standards
17.04 Select and use MIG to complete a weld.	

Florida Department of Education
Student Performance Standards

Course Title: **Technical Agriculture Operations 3**
Course Number: **8005120**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

CTE Standards and Benchmarks		National Standards
18.0	Service and maintain small gasoline engines. The student will be able to:	
18.01	Demonstrate appropriate safety precautions and equipment	
18.02	Explain the scientific principles of small engines.	
18.03	Identify major parts and describe the general operation of small gasoline engines (2- and 4-stroke cycle).	PST.03.01.02.a
18.04	Troubleshoot and perform minor repairs on small gasoline engines.	PST.03.01.01.c
19.0	Perform preventive maintenance, checks, and services for agricultural equipment. The student will be able to:	
19.01	Explain the scientific principles of hydraulic and transmission systems.	PST.03.02.01.a PST.03.03.01.b
19.02	Perform daily operator maintenance checks for equipment.	
19.03	Determine the preventive-maintenance procedures, using the equipment’s operator manual.	
19.04	Perform scheduled preventive-maintenance procedures.	
19.05	Interpret and perform operator's trouble-shooting procedures as described in the manual.	
19.06	Keep records of equipment maintenance and services.	
20.0	Design and maintain an irrigation system. The student will be able to:	
20.01	Demonstrate appropriate safety precautions and equipment	
20.02	Identify the basic components of irrigation systems.	

CTE Standards and Benchmarks		National Standards
	20.03 Differentiate various types of irrigation systems.	
	20.04 Identify state and local regulatory agencies for water management.	
	20.05 Perform minor repair on an irrigation system.	
	20.06 Identify irrigation based on volume and pressure.	
	20.07 Calculate water consumption for an irrigation system.	
21.0	Explain the components of the American business system. The student will be able to:	
	21.01 Describe the five basic ways American business is organized.	
	21.02 Distinguish and identify between the characteristics of each method of doing business.	
	21.03 Evaluate the advantages and disadvantages provided by each business method.	
	21.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.	
22.0	Investigate agricultural cooperatives structure and function. The student will be able to:	
	22.01 Explain the definition of a cooperative.	
	22.02 Understand the history of cooperative principles and practices.	
23.0	Mix and pour concrete and use masonry materials. The student will be able to:	
	23.01 Demonstrate appropriate safety precautions and equipment	
	23.02 Calculate concrete and other materials for a masonry project.	PST.04.04.05.a
	23.03 Prepare forms; mix and pour concrete.	PST.04.04.05.b
24.0	Construct and maintain agricultural structures. The student will be able to:	
	24.01 Demonstrate appropriate safety precautions and equipment	
	24.02 Read and interpret basic construction plans.	PST.04.02.01.a
	24.03 Lay out an agricultural structure for construction with the use of a transit.	
	24.04 Demonstrate basic carpentry construction and procedures.	

CTE Standards and Benchmarks	National Standards
24.05 Construct a fence.	PST.04.04.06.b
24.06 Maintain and repair agricultural structures.	

Florida Department of Education
Student Performance Standards

Course Title: **Technical Agriculture Operations 4**
Course Number: **8005130**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

CTE Standards and Benchmarks		National Standards
25.0	Keep records. The student will be able to:	
25.01	Explain the purpose and importance of keeping records.	
25.02	Demonstrate procedures for keeping records of equipment maintenance and services.	
25.03	Keep records on each job or project assignment.	
25.04	Complete work orders, service invoices, and requisitions.	
25.05	Prepare a written cost estimate of repair work.	
26.0	Weld, braze, and cut, using appropriate equipment. The student will be able to:	
26.01	Practice all recommended safety precautions.	
26.02	Set up, adjust, operate, and maintain MIG (metal inert gas) and TIG (tungsten inert gas) welding equipment.	PST.04.04.07
26.03	Set up, adjust, and operate plasma cutting equipment.	PST.04.04.07
26.04	Select recommended operational procedures and supplies for specific jobs.	
26.05	Demonstrate the different welding positions.	PST.04.04.07
26.06	Cut and pierce metals, using oxyacetylene and plasma.	PST.04.04.07
26.07	Braze metals.	PST.04.04.07
26.08	Store welding equipment and supplies according to the recommended storage procedures.	

CTE Standards and Benchmarks		National Standards
27.0	Operate, service, test, and maintain agricultural machinery and equipment. The student will be able to:	
27.01	Follow safety precautions when operating, servicing, and maintaining machines and equipment.	
27.02	Operate, diagnose, and adjust common agricultural machinery and equipment, according to the operator's manuals. (Examples include tractors, mowers, sprayers, and fertilizer spreaders)	
27.03	Diagnose, remove, clean, test, repair, and reinstall parts of machinery and equipment, using repair manuals.	
27.04	Discuss the principles of GPS & GIS and its use with precision farming equipment.	PST.05.03.01
27.05	Demonstrate techniques in land measurement. (including differential and profile techniques)	
28.0	Discuss the role of refrigeration in agriculture. The student will be able to:	
28.01	Demonstrate appropriate safety precautions and equipment	
28.02	Describe the primary components of a refrigeration system.	
29.0	Demonstrate knowledge of new and emerging technologies in agriculture. The student will be able to:	
29.01	Discuss new power technologies.	
29.02	Discuss developing energy sources	
29.03	Discuss energy management issues.	

Florida Department of Education
Student Performance Standards

Course Title: **Technical Agriculture Operations 5**
Course Number: **8005140**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of service, repair, and maintenance of the following: the lubrication system; the cooling system; the intake, exhaust, and turbo-charged systems; the fuel-delivery system; hydraulics and pneumatics; transmissions; and the brake system.

CTE Standards and Benchmarks		National Standards
30.0	Diagnose, service, and repair the lubrication system. The student will be able to:	
30.01	Change oil filters.	
30.02	Check and change oils and other lubricants in engines.	
30.03	Diagnose and replace damaged or worn components of the system.	
31.0	Test, repair and/or replace, and maintain the cooling system. The student will be able to:	
31.01	Test coolant.	PST.03.05.01.c
31.02	Flush and clean the system.	PST.03.05.01.c
31.03	Test, repair and/or replace parts of the system.	PST.03.05.01.c
31.04	Adjust parts of the system for proper operation.	PST.03.05.01.c
32.0	Test, repair and/or replace the intake, exhaust, and turbo-charged systems. The student will be able to	
32.01	Troubleshoot the intake, exhaust, and turbo-charged systems, using recommended diagnostic equipment.	
32.02	Repair and replace parts of the systems.	
32.03	Service and adjust the systems for proper operation.	
33.0	Test, repair and/or replace the fuel-delivery system, using service manuals. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	33.01 Identify how to remove, clean, rebuild, and reinstall carburetors.	
	33.02 Bleed the diesel-fuel system.	
	33.03 Remove and reinstall a diesel-fuel-injection pump, according to the manufacturer's specifications.	
	33.04 Discuss how to replace components of the fuel system.	
	33.05 Service and adjust parts of the fuel system for proper operation.	
	33.06 Service electronic fuel injection for gas engines.	
34.0	Test, repair and/or replace, and maintain the brake system. The student will be able to:	
	34.01 Drain, refill, and adjust the brake system.	
	34.02 Repair and replace parts of the system.	
	34.03 Service and adjust the system for proper operation.	
35.0	Diagnose, service, repair, and maintain the hydraulic system. The student will be able to:	
	35.01 Change filters and drain, flush, and refill the hydraulic system.	
	35.02 Troubleshoot hydraulic-system components, using recommended diagnostic equipment.	PST.03.03.03.c
	35.03 Repair and replace parts of the system.	PST.03.03.03.c
	35.04 Service and adjust the system for proper operation	PST.03.03.03.c
36.0	Diagnose, service, and repair transmission systems. The student will be able to:	
	36.01 Troubleshoot transmission components, using recommended diagnostic equipment.	
	36.02 Repair and replace parts of transmission systems.	
	36.03 Service and adjust parts of different transmission systems for proper operation.	
	36.04 Service and repair transfer case	
	36.05 Troubleshoot transfer case components.	
	36.06 Service and adjust system components.	

CTE Standards and Benchmarks	National Standards
36.07 Repair and replace system components.	
36.08 Change filters and drain, flush, and refill the transfer case system.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Agricultural Use of UAS Technology**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8005200
CIP Number	0141039901
Grade Level	11-12
Program Length	1 credit
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (All applicable)	19-4099 – Life, Physical, and Social Science Technicians, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Capstone Course

The purpose of this course is to provide students who have completed or are currently completing a specific secondary job preparatory program for additional study in an agricultural program, a capstone experience in Unmanned Aircraft Systems (UAS) Technology for agriculture. This course is designed to enhance competencies in the areas of agricultural science and UAS technology. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This course may be taken only by a student who has completed or is currently completing a specific secondary job preparatory program for additional study in this career cluster.

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8005233	Agricultural Use of UAS Technology	AGRICULTUR 1*	1 credit	19-4099	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Teacher Certification: Teachers must hold the traditional agriculture teacher certification and an Unmanned Safety Credential to teach this course.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Investigate the origins and development of unmanned aviation.
02.0 Develop a plan for powered flight in the National Airspace System.
03.0 Explain aviation rules and regulations as they pertain to UAS.
04.0 Explain concepts and differences in human factors related manned and unmanned aviation.
05.0 Demonstrate Crew Resource Management principles.
06.0 Demonstrate the appropriate attitudes and behaviors associated with the safety mindset.
07.0 Analyze UAS technologies, platforms, and systems.
08.0 Select appropriate UAV to complete a given objective.
09.0 Analyze the ethics and privacy considerations in the operation of unmanned aircraft.
10.0 Model methods to communicate with air traffic control and conflict aircraft.
11.0 Analyze UAS Operating standards and restrictions.
12.0 Explain components of airworthiness.
13.0 Explain aviation safety systems as they apply to UAS.
14.0 Explain new careers that have emerged using technology in agriculture.
15.0 Determine uses for UAS to monitor plant growth.
16.0 Describe how UAS can be used to evaluate soil conditions.
17.0 Develop an integrated pest management (IPM) plan using information from UAS technology.
18.0 Develop fertilizer recommendations by interpreting multiple data sources.
19.0 Determine uses for UAS to monitor animal operations.
20.0 Determine the applications of UAS to provide data forage producers.
21.0 Determine the applications of UAS to provide data on agricultural crops.
22.0 Determine the applications of UAS to provide data to foresters.

Florida Department of Education
Student Performance Standards

Course Title: **Agriculture Use of UAS Technology**
Course Number: **8005233**
Course Credit: **1**

CTE Standards and Benchmarks	
01.0	Investigate the origins and development of unmanned aviation. The student will be able to:
01.01	Actively participate in a group to present important systems, people, and technologies important to the development of the industry.
01.02	Summarize the evolution of commercial UAS operations in the United States.
01.03	Explain the limitations and constraints placed on the development of commercial UAS.
01.04	Describe the process and evolution of a UAS regulatory framework.
01.05	Explain technologies that led to modern day UAS.
01.06	Describe the events important to the development of UAS.
01.07	Explain classification schemes of UAS.
01.08	Explain intelligence modes of control for UAS.
01.09	Explain the difference between direct control versus supervisory control.
01.10	Design a diagram illustrating the differences and similarities between beyond line of sight, beyond visual line of sight, electronic line of sight, and visual line of sight.
02.0	Develop a plan for powered flight in the National Airspace System. The student will be able to:
02.01	Interpret Aeronautical Charts to determine airspace for a given location.
02.02	Explain the classes of airspace.
02.03	Describe weather and associated hazards to aviation.
02.04	Interpret “official” sources of weather to make sound decision.
02.05	Interpret the Notices to Airman Information reporting system.
02.06	Interpret both airport and center NOTAMs.

CTE Standards and Benchmarks	
03.0	Explain aviation rules and regulations as they pertain to UAS. The student will be able to:
03.01	Explain the limitations and requirements of Visual Flight Rules as they pertain to UAS.
03.02	Explain state and local rules and regulations governing UAS.
04.0	Explain concepts and differences of in human factors related to manned and unmanned aviation. The student will be able to:
04.01	Explain the human factors of UAS operations.
04.02	Explain how ground control stations operate.
04.03	Describe personnel required for UAS operations.
04.04	Explain how human factors effect operation.
04.05	Demonstrate an understanding of human imitations in perception, processing, and performance
04.06	Describe the type and causes of human errors.
04.07	Describe the physiological effects of drugs and alcohol.
04.08	Describe methods for dealing with automation and the lack of sensory cues.
05.0	Demonstrate Crew Resource Management principles. The student will be able to:
05.01	Explain the purpose of Crew Resource Management.
05.02	Describe situational awareness.
05.03	Demonstrate effective crew communication and coordination.
05.04	Utilize advocacy and inquiry to champion a course of action.
05.05	Describe strategies for dealing with task saturation or overloads.
05.06	Demonstrate the skills associated with aeronautical decision making and operational analysis.
05.07	Demonstrate proper site survey and analysis skills.
06.0	Demonstrate the appropriate attitudes and behaviors associated with the safety mindset. The student will be able to:
06.01	Describe and demonstrate professional conduct.

CTE Standards and Benchmarks	
	06.02 Demonstrate the importance of being risk averse in UAS planning and flight.
07.0	Analyze UAS technologies, platforms, and systems. The student will be able to:
	07.01 Summarize UAS intelligence and components.
	07.02 Summarize platform capabilities and limitations.
	07.03 Analyze the control station of UAS.
	07.04 Summarize the payload element of UAS
	07.05 Analyze the environment in which the UAS operate.
	07.06 Explain frequency management in the United States.
	07.07 Assess UAS lifecycle and its implication on UAS operations.
	07.08 Compare UAS component reliability and operational considerations.
	07.09 Describe UAS user interfaces.
	07.10 Analyze levels of automation in robotic systems.
	07.11 Analyze when to use UAS rather than manned aircraft.
	07.12 Describe UAS sensors used for navigation and stabilization.
08.0	Select appropriate UAV to complete a given objective. The student will be able to:
	08.01 Explain characteristics of airborne robotic systems.
	08.02 Compare wing designs and benefits of each to the field of UAS.
	08.03 Analyze criteria set forth via a request for proposal to identify appropriate aircraft to conduct operations.
	08.04 Compare energy sources available for UAS.
	08.05 Compare payload options and apply them to appropriate operations.
	08.06 Explain uses of infrared technology.
09.0	Analyze the ethics and privacy considerations in the operation of unmanned aircraft. The student will be able to:

CTE Standards and Benchmarks	
	09.01 Explain the regulations and policies currently in place for UAS operations.
	09.02 Describe the foundations of an ethical code of conduct for UAS operators.
	09.03 Define professional use of UAS.
	09.04 Demonstrate standards of professionalism in everyday operations.
	09.05 Analyze ethical use of robotic aircraft. (safety of people)
10.0	Model methods to communicate with air traffic control and conflict aircraft. The student will be able to:
	10.01 Describe aviation communications practices.
	10.02 Explain the essential information required in aviation communication.
	10.03 Use the Aeronautical Information Manual to make a radio call.
11.0	Analyze UAS Operating standards and restrictions. The student will be able to:
	11.01 Analyze UAS limitations and regulations.
	11.02 Explain guidelines and safety protocols.
	11.03 Explain the reporting requirements for UAS operations.
12.0	Explain components of airworthiness. The student will be able to:
	12.01 Explain the concept of system limitations.
	12.02 Prepare airworthiness inspections.
13.0	Explain aviation safety systems as they apply to UAS. The student will be able to:
	13.01 Explain the four pillars of a safety management system (SMS).
	13.02 Conduct a risk assessment.
	13.03 Develop risk mitigation strategies.
	13.04 Explain methods for safety assurance and promotion.
	13.05 Describe how a well working SMS can recover from an accident.

CTE Standards and Benchmarks	
14.0	Explain new careers that have emerged using technology in agriculture. The student will be able to:
14.01	Identify significant career shifts with technology in the agriculture industry.
14.02	Examine the role of technology in the agriculture industry.
14.03	Solve mathematical applications using technology.
14.04	Describe technologies associated with active and passive remote sensing payloads.
14.05	Explain the limitations of remote sensing.
15.0	Determine uses for UAS to monitor plant growth. The student will be able to:
15.01	Describe the uses of UAS remote sensing technology to examine the processes of plant growth.
15.02	Determine the health of plant using chlorophyll counts.
15.03	Identify nutrient deficiencies in plants using UAS remote sensing technology.
16.0	Describe how UAS can be used to evaluate soil conditions. The student will be able to:
16.01	Analyze soil properties using UAS remote sensing technology.
16.02	Develop a plan to use UAS technology in best management practices for irrigation.
16.03	Examine irrigation application effectiveness using UAS technology.
17.0	Develop an integrated pest management (IPM) plan using information from UAS technology. The student will be able to:
17.01	Identify pests and diseases and the damage they cause.
17.02	Recommend appropriate solutions for pest and disease control.
17.03	Differentiate between nutrient deficiencies and pest/disease damage in plants.
18.0	Develop fertilizer recommendations by interpreting multiple data sources. The student will be able to:
18.01	Identify nutrient deficiencies plan using UAS remote sensing.
18.02	Make fertilizer recommendations based on data from visual appraisal of plants and soil samples.
18.03	Determine the appropriate type and rate of fertilizer to apply to plants.

CTE Standards and Benchmarks	
19.0	Determine uses for UAS to monitor animal operations. The student will be able to:
19.01	Describe the uses of UAS technology to observe animals.
19.02	Identify animals using UAS remote sensing.
19.03	Determine calving percentages using UAS remote sensing.
19.04	Identify the systems of common diseases of cattle, sheep, and goats.
20.0	Determine the applications of UAS to provide data forage producers. The student will be able to:
20.01	Identify common forages, pests, and diseases using UAS remote sensing.
20.02	Identify the growth stage of forage crops.
20.03	Identify common diseases that impact forage crops.
20.04	Evaluate forage and hay as a source of nutrition for animals.
21.0	Determine the applications of UAS to provide data on agricultural crops. The student will be able to:
21.01	Use UAS remote sensing technology to identify pest and diseases.
21.02	Analyze the use of UAS for early detection of diseases.
21.03	Calculate yield estimates using UAS data.
21.04	Evaluate and monitor crops using UAS remote sensing technology to predict harvest times.
22.0	Determine the applications of UAS to provide data to foresters. The student will be able to:
22.01	Identify economically important tree species.
22.02	Identify forest pests, insects and diseases using UAS remote sensing techniques.
22.03	Make forest management decisions using data from UAS images and data.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Natural Resources**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8006200
CIP Number	0103010302
Grade Level	9-12
Program Length	5 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	19-4091 -- Environmental Science and Protection Technicians, Including Health 19-1031 -- Conservation Scientists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ
8006220	Introduction to Natural Resources 2	AGRICULTUR 1 @2	1 credit	19-4091	3	CT
8006230	Natural Resource Technology 3		1 credit	19-4091	3	CT
8006240	Natural Resource Management 4		1 credit	19-1031	3	CT
8006250	Advanced Natural Resources 5		1 credit	19-1031	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Introduction to Natural Resources 2

09.0 Identify major ecosystems in Florida.
10.0 Describe hydrology.
11.0 Practice safety skills and procedures.
12.0 Demonstrate sampling procedures.
13.0 Collect and test samples used to determine soil characteristics.
14.0 Describe related geologic principles.
15.0 Discuss related standards and regulations.
16.0 Identify wetland management practices.
17.0 Describe methods to manage wildlife.
18.0 Describe procedures to manage forests.

Natural Resource Technology 3

19.0 Utilize data and resources.
20.0 Determine the quality and quantity of water resources.
21.0 Describe stormwater systems.
22.0 Develop map reading skills.
23.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
24.0 Describe procedures for managing hazardous materials.
25.0 Prepare a plan for a mock disaster activity.
26.0 Identify career opportunities and organizational dynamics.

Natural Resource Management 4

27.0 Analyze wildlife management procedures.
28.0 Analyze forest management techniques.
29.0 Identify forest fire management techniques.

30.0 Discuss Pest management for insects.

Advanced Natural Resources 5

31.0 Analyze the management of ecosystems.
32.0 Discuss ecology restoration.
33.0 Discuss the principles of land use planning.
34.0 Discuss managing and disposing of solid waste.
35.0 Evaluate the importance of the food and fiber system to understand the impact on global economy.
36.0 Examine the scope of career opportunities in and the importance of agriculture and natural resources to the economy.
37.0 Demonstrate the use of weather and climate data.
38.0 Discuss sustainable agriculture.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Natural Resources 2**
Course Number: **8006220**
Course Credit: **1**

Course Description:

This course was developed as a core and is designed to develop competencies in the areas of Environmental Resources in agriculture, scientific investigation, laboratory safety, scientific and technological concepts; and the fundamentals of biotechnology.

CTE Standards and Benchmarks		National Standards
09.0	Identify major ecosystems in Florida. The student will be able to:	
09.01	Identify common plant and animal species of the major ecosystems.	
09.02	Identify the boundary between uplands and wetlands using resources such as: aerial photographs, soils, plants, and/or hydrology.	
09.03	Identify environmental factors affecting Florida's major ecosystems.	
09.04	Identify threatened and endangered plant and animal species of specific habitats.	
09.05	Analyze biological and economical, impacts on managing ecosystems.	
09.06	Trace the effects of pollution through an ecosystem.	
09.07	Explain how lack of predation contributes to uncontrollable exotic populations.	
09.08	Explain how exotic populations stress native.	
10.0	Describe hydrology. The student will be able to:	
10.01	Define basic hydrological terms.	
10.02	Explain surface water systems.	
10.03	Explain ground water systems.	
10.04	Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.	
10.05	Discuss the Clean Water Act.	

CTE Standards and Benchmarks		National Standards
	10.06 List the components of Florida's fresh water systems (lakes, ground water, aquifer, springs, rivers, sink holes and swamps) and explain the importance of managing these resources.	
11.0	Practice safety skills and procedures. The student will be able to:	
	11.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.	
	11.02 Identify and utilize safe practices with equipment.	
	11.03 Identify physical, chemical, biological, and zoological hazards.	
	11.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA) regulations.	
	11.05 Determine, review, and follow relevant regulations.	
	11.06 Maintain appropriate safety records.	
	11.07 Identify and describe “on the job” hazards and risks including fire/explosive, lead asbestos, and weather hazards.	
12.0	Demonstrate sampling procedures. The student will be able to:	
	12.01 Define sampling objectives and protocol.	
	12.02 Operate, calibrate, and maintain sampling equipment.	
	12.03 Develop sampling strategy.	
	12.04 Perform applicable field measurements.	
	12.05 Appropriately preserve, document, and dispose of samples.	
	12.06 Identify cross-contamination and other risks associated with sampling.	
	12.07 Describe, plan, and utilize quality assurance practices.	
	12.08 Perform periodic follow-up sampling.	
13.0	Collect and test samples used to determine soil characteristics. The student will be able to:	
	13.01 Collect soil samples from test area and complete soil data forms.	
	13.02 Determine soil pH using pH test kit.	

CTE Standards and Benchmarks		National Standards
	13.03 Conduct soil and mineral and analysis using soil test kit.	
	13.04 Determine and record texture, structure, temperature and color of each soil layer.	
	13.05 Analyze soil data and write lab report.	
	13.06 Determine the effect of texture, density, and porosity on permeability/infiltration rates and seasonal high groundwater table.	
	13.07 Examine the relationship between soil texture, water movement and water holding capacity.	
	13.08 Determine land class capability utilizing resources, such as: NRCS County Soil Survey, using Geographic Information Systems or other resources.	
14.0	Describe related geologic principles. The student will be able to:	
	14.01 Explain the geological history of Florida.	
	14.02 Analyze a soil profile and describe the associated components.	
	14.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.	
	14.04 Interpret legal descriptions of land.	
	14.05 Identify mapping and surveying techniques and equipment.	
15.0	Discuss related standards and regulations. The student will be able to:	
	15.01 Identify where local state, and federal regulations are documented and describe their impact.	
	15.02 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statures.	
	15.03 Research how rules and laws are made and implemented.	
	15.04 Research and report how endangered species get listed at the state and federal level.	
16.0	Identify wetland management practices. The student will be able to:	
	16.01 Identify ecosystems.	
	16.02 Discuss the structure, function, and delineation of wetlands. (Including characteristics, habitat value, and wetland fauna and flora.	
	16.03 Define characteristics of wetlands.	

CTE Standards and Benchmarks		National Standards
16.04	Discuss habitat value.	
16.05	Identify wetland fauna and flora.	
16.06	Determine desirable vs. invasive plant and animal species in Florida wetlands.	
16.07	Research control treatments for invasive plants.	
16.08	Discuss mitigation techniques.	
16.09	Evaluate impacts on wetlands.	
17.0	Describe methods to manage wildlife. The student will be able to:	
17.01	Identify wildlife species in the various Florida environments.	
17.02	Identify and describe life cycle of game species and non-game.	
17.03	Discuss urban wildlife management.	
17.04	Identify wildlife management techniques and principles.	
17.05	Identify common wildlife diseases and parasites.	
17.06	Discuss wildlife population dynamics.	
18.0	Describe procedures to manage forests. The student will be able to:	
18.01	Describe dendrology.	
18.02	Describe silviculture. (Including harvesting techniques, timber stand improvements)	
18.03	Describe replanting techniques.	
18.04	Describe the need for prescribed fires.	
18.05	Identify timber and forest products.	

Florida Department of Education
Student Performance Standards

Course Title: **Natural Resource Technology 3**
Course Number: **8006230**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of water treatment, stormwater systems, Geographic Informational and Global Positioning Systems, environmental standards and regulations, career opportunities; scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

CTE Standards and Benchmarks		National Standards
19.0	Utilize data and resources. The student will be able to:	
19.01	Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and GIS.	
19.02	Locate and interpret reference materials.	
19.03	Maintain necessary/required record keeping practices and procedures.	
19.04	Discuss Federal and state requirements for (TMDL) Total Maximum daily loads and minimum flows and levels.	
19.05	Describe the establishment and implementation of TMDL in Florida.	
19.06	Identify potential sources of point and non-point pollution.	
19.07	Identify the five water management districts in Florida.	
19.08	Define minimum flows and levels for a water management district.	
20.0	Determine the quality and quantity of water resources. The student will be able to:	
20.01	Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.	
20.02	Describe wastewater disposal options.	
20.03	Identify septic tanks types and functions.	

CTE Standards and Benchmarks		National Standards
	20.04 Determine water quality of groundwater, rivers, lakes, and spring water.	
	20.05 Determine stream flow.	
	20.06 Collect, store and label water samples from a representative test site.	
	20.07 Determine the quality of water samples by measuring for pH, turbidity, dissolved solids and dissolved oxygen.	
	20.08 Investigate water shed boundaries and drainage patterns.	
	20.09 Monitor water levels of rivers, streams, ponds and lakes.	
21.0	Describe stormwater systems. The student will be able to:	
	21.01 Demonstrate knowledge of runoff through use of terminology	
	21.02 Recognize soil types and land cover as related to runoff.	
	21.03 Recognize erosion, non-point source pollution and erosion control methods.	
	21.04 Define topography and groundcover and its effects on stormwater.	
22.0	Develop map reading skills. The student will be able to:	
	22.01 Review aerial maps.	
	22.02 Interpret topographical and flood plain maps.	
	22.03 Interpret legal land descriptions.	
	22.04 Interpret current and historical aerial photography for land cover and land use applications.	
	22.05 Explain topographic map symbols and legends.	
	22.06 Measure acreage on maps.	
	22.07 Determine location and other information from maps, using technology such as Global Positioning System (GPS) and/or compass.	
23.0	Use Geographic Informational (GIS) and Global Positioning (GPS) Systems. The student will be able to:	
	23.01 Define GIS and its function.	

CTE Standards and Benchmarks		National Standards
	23.02 Use GIS software.	
	23.03 Learn GIS applications.	
	23.04 Define GPS and its function.	
	23.05 Collect GPS data and load on GIS.	
	23.06 Identify other remote sensing tools.	
24.0	Describe procedures for managing hazardous materials. The student will be able to:	
	24.01 Describe flow and life cycles of materials.	
	24.02 Identify proper chemical handling and storage guidelines.	
	24.03 Describe material management procedures.	
	24.04 Identify waste minimization, pollution prevention and alternatives to disposal.	
	24.05 Describe shipping and transportation procedures for hazardous materials.	
	24.06 Identify principles of toxicology.	
	24.07 Identify routes of exposure.	
	24.08 Discuss common chemical compatibility.	
25.0	Prepare a plan for a mock disaster activity. The student will be able to:	
	25.01 Describe the need for and types of pre-planning.	
	25.02 Identify and select necessary agency involvement for the type of disaster.	
	25.03 Identify possible areas and types of impacts.	
	25.04 Write and evaluate contingency plans.	
	25.05 Create a plan for a disaster clean up including needed materials and equipment.	
26.0	Identify career opportunities and organizational dynamics. The student will be able to:	

CTE Standards and Benchmarks		National Standards
26.01	Identify careers and opportunities in the following fields: agriculture, Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.	
26.02	Identify the opportunities for leadership development available through an appropriate student and/or professional organization.	

Florida Department of Education
Student Performance Standards

Course Title: **Natural Resource Management 4**
Course Number: **8006240**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of land management, weather systems, wildlife programs, commodity and non-commodity resources, sustainable agriculture, and environmental research.

CTE Standards and Benchmarks		National Standards
27.0	Analyze wildlife management procedures. The student will be able to:	
27.01	Discuss basic mammalogy, ornithology, and herpetology.	
27.02	Use a dichotomous key.	
27.03	Conduct experimental design and statistical analysis.	
27.04	Collect and interpret data from a wildlife study.	
28.0	Analyze forest management techniques. The student will be able to:	
28.01	Identify related forestry equipment.	
28.02	Identify surveying techniques.	
28.03	Describe a timber cruising activity.	
28.04	Perform a pacing exercise.	
28.05	Describe how to calculate timber volumes using a Biltmore stick.	
28.06	Identify and discuss Forestry Best Management Practices (BMP).	
29.0	Identify forest fire management techniques. The student will be able to:	
29.01	Describe the history of prescribed fire usage in Florida.	
29.02	Discuss the effects of prescribed burns and wildfires on communities in Florida.	

CTE Standards and Benchmarks		National Standards
	29.03 Discuss fire weather behavior.	
	29.04 Discuss seasonal ecological effects of burning.	
	29.05 Identify and discuss wildfire suppression techniques.	
	29.06 Describe prescribed burn techniques.	
	29.07 Identify and discuss safety equipment and practices related to fire management.	
	29.08 Discuss how burning of vegetation releases nutrients into the soil and carbon in the atmosphere.	
	29.09 Investigate the merits of growing season burns versus non-growing season burns.	
	29.10 Discuss safety precautions for controlled burns and legal ramifications.	
30.0	Discuss Pest management for insects. The student will be able to:	
	30.01 Assess environmental impact of pests.	
	30.02 Discuss common pests.	
	30.03 Describe life cycles of common pests.	
	30.04 Classify insects using a dichotomous key	
	30.05 Describe the principles and benefits of integrated pest management (biological, chemical, and cultural).	
	30.06 Conduct pest population studies.	
	30.07 Identify diseases and pests that impact agriculture production.	
	30.08 Explain methods to control and eradicate diseases and pests.	
	30.09 Describe isolation or quarantine methods to minimize spread of diseases and pests.	

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Natural Resources 5**
Course Number: **8006250**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the management of pests and ecosystems, planning and administering land usage, ecology restoration, career opportunities; scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing, and observation equipment.

CTE Standards and Benchmarks		National Standards
31.0	Analyze the management of ecosystems. The student will be able to:	
31.01	Describe biological and economic impacts on managing ecosystems.	
31.02	Describe the effects of manipulating species within an ecosystem.	
31.03	Discuss biodiversity and discuss effect of bio diversity.	
31.04	Evaluate how external factors affect communities.	
31.05	Identify vegetation monitoring techniques	
31.06	Conduct vegetation sampling and analysis.	
32.0	Discuss ecology restoration. The student will be able to:	
32.01	Research of vegetation dynamics.	
32.02	Describe restoration techniques.	
32.03	Research wetlands reclamation and uplands restoration.	
32.04	Diagnose restoration from a systems approach.	
32.05	Research applicable monitoring techniques.	
33.0	Discuss the principles of land use planning. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	33.01 Identify typical land use types in Florida and environmental issues	
	33.02 List the elements of a growth management plan	
	33.03 Describe the principles of growth management	
	33.04 Discuss the role of local government in growth management	
	33.05 Describe buffer areas and protected lands.	
34.0	Discuss managing and disposing of solid waste. The student will be able to:	
	34.01 Describe history of solid waste disposal.	
	34.02 Identify types of waste.	
	34.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)	
	34.04 Identify pollution prevention and source reduction options.	
35.0	Evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:	
	35.01 Assess the agricultural impact upon the US gross national product and the total global economy.	
	35.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.	
	35.03 Identify and describe the primary government agencies involved with agriculture.	
	35.04 Research new and emerging technologies and their impact on the economy.	
	35.05 Recognize the value of the food and agribusiness industry.	
36.0	Examine the scope of career opportunities in and the importance of agriculture and natural resources to the economy. The student will be able to:	
	36.01 Define and explore natural resources and agribusinesses and their role in the economy.	
	36.02 Evaluate and explore the agribusiness and natural resource career opportunities.	
	36.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.	
37.0	Demonstrate the use of weather and climate data. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	37.01 Interpret a weather map.	
	37.02 Obtain and record measurements of local rainfall, temperature, air pressure, relative humidity, cloud cover and type, and wind speed.	
	37.03 Analyze the impact of weather and climate in regard to risk management.	
38.0	Discuss sustainable agriculture. The student will be able to:	
	38.01 Describe why it is important to sustain domestic agriculture.	
	38.02 Explain international issues affecting domestic agriculture.	
	38.03 Apply principles of nutrient, water, and waste management to environmental problems.	
	38.04 Compare practices that either enhance or hinder the sustainability of agriculture.	
	38.05 Analyze the benefit of recent technological advances on the agricultural industry.	
	38.06 Identify and monitor erosion hazards and environmental quality.	
	38.07 Describe Best Management Practices (BMP) and their significance. (Including management for water quality and conservation, and pesticide use)	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Environmental Water & Reclamation Technology**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8007300
CIP Number	0115050601
Grade Level	9-12
Program Length	4 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	51-8031 -- Water and Wastewater Treatment Plant and System Operators
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to applications of water resource management, application of safety procedures, record keeping and sampling, wetland management, reclamation treatment techniques, solid waste disposal, storm water management, hazardous material storage, government water technology regulations, filtrations, sedimentation, fluoridation process, and perform maintenance and inspections on equipment.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8007110	Introduction to Environmental Water Technology	ENV WAT TE 7G BIOLOGY 1 CHEM 1 ERTH/SPA S 1	1 credit	51-8031	2	CT
8007120	Intermediate Environmental Water Technology		1 credit	51-8031	2	CT
8007130	Advanced Environmental Water Technology		1 credit	51-8031	2	CT
8007210	Advanced Environmental Water Reclamation Technology		1 credit	51-8031	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Introduction to Environmental Water Technology

01.0 Identify the historical, social, cultural and potential applications of water resource management.
02.0 Describe and discuss hydrology.
03.0 Practice safety skills and procedures.
04.0 Demonstrate record keeping and sampling procedures.
05.0 Describe and discuss geologic principles of water resources.
06.0 Manage wetlands.
07.0 Identify career opportunities and organizational dynamics.
08.0 Apply scientific and technological principles.
09.0 Describe reclaimed water treatment techniques.
10.0 Collect and dispose of solid waste.
11.0 Explain water treatment techniques.
12.0 Discuss and manage stormwater systems.
13.0 Describe water distribution.
14.0 Demonstrate the management and environmentally sound use of water resources.
15.0 Describe water treatment equipment and facilities.

Intermediate Environmental Water Technology

16.0 Discuss related standards and regulations.
17.0 Conduct site assessment.
18.0 Practice safety skills and procedures.
19.0 Manage data and physical resources.
20.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
21.0 Control incidents.
22.0 Prepare a plan.
23.0 Perform remediation.
24.0 Collect and dispose of solid waste.
25.0 Identify continuing education needs and opportunities.
26.0 Conduct recordkeeping and sampling procedures.
27.0 Review stormwater permit procedures.
28.0 Demonstrate the use of industry appropriate tools, equipment, and instruments.
29.0 Demonstrate industry specific mathematical calculations.
30.0 Demonstrate industry specific science skills and techniques.
31.0 Identify career opportunities and organizational dynamics in water resources.
32.0 Demonstrate water treatment techniques.
33.0 Discuss an Industrial Pretreatment Program/Inspection.

34.0 Discuss comprehensive quality assurance plan.
35.0 Identify professions related to the water technology field.

Advanced Environmental Water Technology
36.0 Identify scientific concepts common in water and wastewater treatment.
37.0 Identify safety hazards associated with water technologies.
38.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
39.0 Solve basic math problems common to water technologies.
40.0 Define pumping and basic hydraulic principles.
41.0 Define principles of disinfection.
42.0 Define sampling techniques.
43.0 Define federal, state, and local regulations that apply to water technologies.
44.0 Demonstrate employability skills.
45.0 Identify sampling techniques and explain the significance of the steps.
46.0 Identify chemical, biological, and physical constituents of water entering the water treatment facility or distribution systems.
47.0 Describe the principles, operational and troubleshooting practices of the aeration process.
48.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
49.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
50.0 Describe the principles, operational and troubleshooting practices of the filtration process.
51.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
52.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
53.0 Describe the principles, operational and troubleshooting practices of the corrosion control process.
54.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
55.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
56.0 Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes.
57.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
58.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
59.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
60.0 Identify facility operational problems.
61.0 Describe basic hydraulics and pumping operations.
62.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility.
63.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.

Advanced Environmental Water Reclamation Technology
64.0 Identify the basic characteristics and principles of wastewater treatment.
65.0 Identify sampling techniques and interpret the results.
66.0 Describe the sources of wastewater and the types of collection systems.
67.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management.
68.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management.

69.0 Identify and correct facility operational problems.
70.0 Identify appropriate federal, state, and local regulations.
71.0 Describe federal, state and local laws for the handling, storage, and use of toxic and hazardous materials.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Environmental Water Technology**
Course Number: **8007110**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of hydrology, safety skills and procedures, geological principles of water resources, management of wetlands, storm water systems, environmental water resources, equipment and facility maintenance, scientific and research concepts; principles of leadership; and employability, and human relations skills. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

CTE Standards and Benchmarks		National Standards
01.0	Identify the historical, social, cultural and potential applications of water resource management. The student will be able to:	
01.01	Explain the developmental progression of water resource management.	
01.02	Research emerging problems and issues with water resource management.	
01.03	Explain the local global importance of water conservation.	
01.04	Explain international issues affecting water resources and water quality.	
01.05	Compare practices that either enhance or hinder water quality.	
01.06	Differentiate between point and non-point sources of pollution.	ESS.04.01.01.a
01.07	Identify diseases and illnesses associated with water borne pathogens.	
01.08	Explain methods to control and eradicate diseases and illnesses associated with water borne pathogens.	
01.09	Explain the significance genetic factors, environmental factors and pathogenic agents to health from the perspective of both individual and public health.	
01.10	Analyze how population size is affected by water quantity and quality.	
01.11	Evaluate the cost and benefits of various water reclamation technologies.	
01.12	Discuss the impact of individuals on water quality and quantity and how human lifestyles affect sustainability.	

CTE Standards and Benchmarks		National Standards
	01.13 Discuss the special properties of water that contribute to earth's suitability as an environment for life.	
02.0	Describe and discuss hydrology. The student will be able to:	
	02.01 Define basic hydrological terms.	ESS.03.02.05.a
	02.02 Describe surface water systems.	
	02.03 Describe ground water systems.	ESS.03.02.04.b
	02.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.	
	02.05 List the components of Florida's freshwater systems (lakes, ground water, aquifer, springs, rivers, and wetlands) and explain the importance of managing these resources.	
	02.06 Identify alternative sources of water.	
	02.07 Identify the relationship of various soil conditions to water quality.	ESS.03.03.01.c
	02.08 Research and explain the effects of saltwater intrusion.	
	02.09 Identify and discuss water wells and water reservoirs.	
03.0	Practice safety skills and procedures. The student will be able to:	
	03.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.	
	03.02 Identify and utilize safe work & laboratory practices.	
	03.03 Identify physical, chemical, biological, and zoological hazards.	
	03.04 Extract and utilize pertinent information from a container label and/or Safety Data Sheets (SDS) following Environmental Protection Agency (EPA), Worker Protection Standard, Occupational Safety and Health Administration (OSHA), and Globally Harmonized System (GHS) regulations.	
	03.05 Determine, review, and follow regulations.	
	03.06 Develop and maintain appropriate safety & laboratory records.	
	03.07 Identify and describe "on the job" & laboratory hazards and risks including fire/explosive, lead asbestos, weather hazards and emergency response preparedness.	
	03.08 Describe how to conduct a Job Hazard Analysis.	
	03.09 Perform lifting activities safely.	

CTE Standards and Benchmarks		National Standards
	03.10 Identify ladder safety and fall protection.	
	03.11 Become certified in first aid/CPR and describe First Responder responsibilities.	
04.0	Demonstrate record keeping and sampling procedures. The student will be able to:	
	04.01 Define sampling objectives, protocol, and Chain of Custody.	
	04.02 Operate, calibrate, and maintain sampling equipment.	
	04.03 Develop sampling strategy.	ESS.04.03.01.c
	04.04 Perform applicable field measurements including pH, dissolved oxygen, temperature, disinfection residuals, and turbidity.	
	04.05 Describe bacterial and viral sampling.	
	04.06 Appropriately preserve, document, and dispose of samples.	
	04.07 Identify cross-contamination and other risks associated with sampling.	
	04.08 Describe, plan, and utilize quality assurance practices.	
	04.09 Submit samples for analysis.	
	04.10 Perform periodic follow-up sampling.	
	04.11 Identify permit requirements and procedures.	
	04.12 Define and follow federal, state and local sampling guidelines.	
05.0	Describe and discuss geologic principles of water resources. The student will be able to:	
	05.01 Explain the geological history of Florida.	
	05.02 Describe Florida aquifer system.	
	05.03 Discuss basic groundwater chemistry and the geological factors that contribute to the varying chemical components of water.	
	05.04 Describe local geology related problems.	
06.0	Manage wetlands. The student will be able to:	

CTE Standards and Benchmarks		National Standards
06.01	Identify environmental significance of ecosystems.	
06.02	Discuss the structure and function of wetlands.	
06.03	Define limits of wetlands.	
06.04	Discuss habitat value.	
06.05	Identify fauna and flora.	
06.06	Determine desirable vs. nuisance plant and animal species.	
06.07	Describe changes in ecosystems resulting from seasonal variations, climate change, environmental impacts, and succession.	
06.08	Explain the general distribution of life in aquatic systems as a function of effluent discharge, stormwater runoff and drought.	
07.0	Identify career opportunities and organizational dynamics. The student will be able to:	
07.01	Describe the nature of career opportunities in water, water reclamation and environmental industries.	
07.02	Compare supervisory and administrative responsibilities.	
07.03	Identify team building communication skills.	
07.04	Identify problem-solving techniques.	
07.05	Identify employee responsibility/benefits.	
07.06	Identify legal aspects of personnel relations.	
07.07	Communicate effectively in verbal, written, and nonverbal modes.	
07.08	Recognize and demonstrate good listening skills.	
07.09	Conduct small informal and formal group meetings.	
07.10	Identify the opportunities for leadership development available through an appropriate student and/or professional organization.	
07.11	Recognize and demonstrate effective communications skills in the workplace.	
07.12	Identify related professional associations.	

CTE Standards and Benchmarks		National Standards
	07.13 List and describe the careers associated with water treatment, distribution, and management.	
	07.14 Determine the educational requirements and experience needed to enter and advance in water, water reclamation and environmental occupations.	
08.0	Apply scientific and technological principles. The student will be able to:	
	08.01 Employ scientific measurement skills.	
	08.02 Demonstrate safe and effective use of common laboratory equipment.	
	08.03 Implement the scientific method and science process skills through the design and completion of a research project.	
	08.04 Interpret, analyze, and report data.	
	08.05 Describe and evaluate emerging technologies in environmental and water treatment technologies	
	08.06 Compare and contrast structure and function of various types of microscopes.	
09.0	Describe reclaimed water treatment techniques. The student will be able to:	
	09.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.	
	09.02 Describe disposal options.	
	09.03 Identify septic tanks types and functions.	
	09.04 Apply principles of nutrients, water, and waste management to environmental problems.	
10.0	Collect and dispose of solid waste. The student will be able to:	
	10.01 Describe the history of solid waste disposal.	ESS.04.02.01.a
	10.02 Identify types of waste.	
	10.03 Identify household hazardous waste collection and disposal programs.	ESS.04.02.02.a
	10.04 Research and evaluate solid waste disposal options (landfill, incineration, and composting, etc.).	
11.0	Explain water treatment techniques. The student will be able to:	
	11.01 Describe drinking water treatments.	ESS.04.03.01.b

CTE Standards and Benchmarks		National Standards
	11.02 Identify and describe the desirable water qualities.	
	11.03 Explain how changes in water quality affect life cycles.	
	11.04 Explain, monitor, and maintain freshwater/saltwater quality standards.	
	11.05 Calculate volume in circular, rectangular and irregular shaped water structures.	
	11.06 List and explain sources of pollution and methods of preventing and/or correcting these pollution problems.	
12.0	Discuss and manage stormwater systems. The student will be able to:	
	12.01 Determine boundaries of watersheds.	
	12.02 Identify runoff coefficients.	
	12.03 Identify the relationship between construction sites and stormwater systems.	
	12.04 Research rules and regulations in regards to stormwater systems.	
	12.05 Contact local municipalities to determine stormwater regulations.	
	12.06 Research current construction trends and methods of stormwater systems.	
	12.07 Define topography and discuss it in relation to stormwater management.	
	12.08 Discuss the effects that uncollected stormwater has on lakes, rivers, ponds, and wetlands.	
13.0	Describe water distribution. The student will be able to:	
	13.01 Identify the need for backflow prevention and cross connections controls.	
	13.02 Identify necessary equipment for water distribution purposes (e.g., pumps, motors, valves, storage tanks, pipes, and fittings).	
	13.03 Understand the purpose and function of water meters.	
	13.04 Identify maintenance requirements for fire hydrants, pipes, and valves.	
	13.05 Identify proper procedures for operation and maintenance of Booster Stations.	
	13.06 Discuss importance of period flushing of water distribution systems.	
	13.07 Identify water quality monitoring requirements for distribution systems.	

CTE Standards and Benchmarks		National Standards
	13.08 Explain Supervisory Control and Data Acquisition Systems (SCADA)	
14.0	Demonstrate the management and environmentally sound use of water resources. The student will be able to:	
	14.01 Determine quality of groundwater and surface water.	
	14.02 Identify solids and dissolved solids found in water.	
	14.03 Identify primary and secondary contaminants.	
	14.04 Identify unregulated organic compounds.	
15.0	Describe water treatment equipment and facilities. The student will be able to:	
	15.01 Research water treatment equipment and facility components.	
	15.02 Identify appropriate temperatures and other external conditions that may affect the water treatment processes.	
	15.03 Identify the effect of weather conditions and changes that may affect the water treatment processes.	
	15.04 Describe appropriate flow rates and tank levels.	
	15.05 Create a checklist of policies and related procedures necessary to handle daily conditions, hazards and/or malfunctions.	
	15.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.	

Florida Department of Education
Student Performance Standards

Course Title: **Intermediate Environmental Water Technology**
Course Number: **8007120**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

CTE Standards and Benchmarks	
16.0	Discuss related standards and regulations. The student will be able to:
16.01	Explain the importance and impacts of local, state, and federal regulations and required documentation.
16.02	Identify where local, state, and federal regulations are documented.
16.03	Discuss the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).
16.04	Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statures.
16.05	Research how rules and laws are made and mandated.
16.06	Describe permitting procedures.
16.07	Identify regulation resources.
16.08	Describe various licensing procedures.
16.09	Research governmental regulation authorities associated with Florida’s water sources.
16.10	Describe the National Pollution Discharge Elimination System (NPDES).
16.11	Identify appropriate agencies and their functions
16.12	Create, evaluate, and present a well-head protection plan.
16.13	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.

CTE Standards and Benchmarks	
17.0	Conduct site assessment. The student will be able to:
17.01	Identify the purposes of site assessment.
17.02	Describe required documentation.
17.03	Interpret blueprints
17.04	Describe location and legal description of property and design a map to locate site characteristics.
17.05	Obtain physical and performance measurements.
17.06	Assess needed equipment and processes.
18.0	Practice safety skills and procedures. The student will be able to:
18.01	Identify safety procedures for: wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.
18.02	Handle compressed gasses, solids, and liquids safely.
18.03	Summarize “Right of Access” law.
18.04	Summarize “Confined Space” regulations.
18.05	Identify Zero Tolerance policies related to safe practices.
18.06	Identify employee limitations.
18.07	Identify appropriate decontamination procedures.
18.08	Identify principles of toxicology.
18.09	Identify routes of exposure.
18.10	Identify respirator safety procedures.
18.11	Discuss history of hazardous materials and hazardous categories.
18.12	Discuss common chemical compatibility.
18.13	Describe and discuss OSHA concepts.
18.14	Describe and discuss the Vulnerability Assessment process.

CTE Standards and Benchmarks	
19.0	Manage data and physical resources. The student will be able to:
19.01	Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, and security.
19.02	Identify possible funding sources.
19.03	Prepare budgets and purchase orders.
19.04	Prepare a time management plan.
19.05	Utilize information databases.
19.06	Locate and interpret printed reference materials.
19.07	Describe network opportunities.
19.08	Maintain necessary/required record keeping practices and procedures.
19.09	Keep inventory, time sheets, and equipment maintenance logs.
19.10	Identify suppliers and technical resources.
20.0	Use Geographic Informational (GIS) and Global Positioning (GPS) Systems. The student will be able to:
20.01	Define GIS and its function in water treatment and utilities.
20.02	Use GIS software.
20.03	Learn GIS applications.
20.04	Develop a GIS model.
20.05	Define GPS and its function in water treatment and utilities.
20.06	Collect GPS data and load on GIS.
20.07	Research and identify other remote sensing tools.
20.08	Identify and plot points on a map.
21.0	Control incidents. The student will be able to:
21.01	Identify and describe reasons for controlling incidents.

CTE Standards and Benchmarks	
	21.02 Describe levels of response.
	21.03 Determine and use proper chain of command.
	21.04 Determine methods of control.
	21.05 Demonstrate site access restriction methods.
	21.06 Identify appropriate authorities to be notified.
	21.07 Place equipment appropriately.
	21.08 Orient zones.
	21.09 Identify possible geographic hazards.
	21.10 Identify media protocol and procedures for communicating with the public.
	21.11 Prepare a press release for a mock incident.
	21.12 Identify abnormal event management processes utilizing the National Information Management System (NIMS).
22.0	Prepare a plan. The student will be able to:
	22.01 Describe the need for and the types of pre-planning.
	22.02 Identify and select necessary agency involvement.
	22.03 Identify possible contamination zones.
	22.04 Review contingency plans
	22.05 Understand the need for contingency plans for hurricanes, tornadoes, floods, fires, and/or nuclear accidents (emergency response plan).
	22.06 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.
	22.07 Create plan for deployment.
	22.08 Conduct mock disaster activities.
	22.09 Review FEMA forms management and documentation.

CTE Standards and Benchmarks	
23.0	Perform remediation. The student will be able to:
23.01	Research appropriate cleaning methods.
23.02	Create a plan for a disaster clean up including needed materials and equipment.
23.03	Understand entry and closure methods.
23.04	Identify contamination removal procedures.
23.05	Design a site/system cleanliness verification procedure.
23.06	Identify tear down and demobilization procedures.
24.0	Collect and dispose of solid waste. The student will be able to:
24.01	Describe the history of solid waste disposal and review the laws that regulate it.
24.02	Identify types of waste.
24.03	Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)
25.0	Identify continuing education needs and opportunities. The student will be able to:
25.01	Determine continuing education needs/goals.
25.02	Identify available educational and financial resources.
25.03	Identify appropriate professional associations and attend meetings where applicable.
25.04	Read and review trade journals.
26.0	Conduct recordkeeping and sampling procedures. The student will be able to:
26.01	Demonstrate sampling, testing and recordkeeping.
26.02	Collect and analyze water samples: grab, composite and representative.
26.03	Record data into identified database program.
26.04	Interpret lab results.
26.05	Evaluate data.

CTE Standards and Benchmarks	
	26.06 Measure well volumes.
	26.07 Describe organism sampling and record observations.
27.0	Review stormwater permit procedures. The student will be able to:
	27.01 Research and demonstrate Best Management Practices (BMP), Standard Operating Procedures (SOP) and Preventive Maintains (PM).
	27.02 Describe proper ditch, pond, culvert, and manhole inspection techniques.
	27.03 Evaluate a storm cleanup and prevention plan.
	27.04 Discuss pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.
	27.05 Describe the importance of outfall structures, inlets, and treatment systems.
	27.06 Describe the procedures to clean and televise pipes.
	27.07 Describe the importance of ditch banks and right of ways.
	27.08 Maintain, repair, and replace pipe sections.
28.0	Demonstrate the use of industry appropriate tools, equipment, and instruments. The student will be able to:
	28.01 Select and demonstrate proper use of industry appropriate tools, equipment, and instruments.
	28.02 Demonstrate various physical science principles as applied in selected mechanical applications (e.g., levers, pulleys, hydraulics, and internal combustion).
	28.03 Service and maintain industry appropriate equipment, instruments, facilities, and supplies.
29.0	Demonstrate industry specific mathematical calculations. The student will be able to:
	29.01 Calculate area and volume.
	29.02 Convert temperature.
	29.03 Calculate velocities and flow rates.
	29.04 Calculate detention time.
	29.05 Calculate parts per million/mg/L.

CTE Standards and Benchmarks	
	29.06 Calculate chemical concentrations and chemical dosages.
	29.07 Utilize conversion factors.
	29.08 Calculate ratios and percentages.
	29.09 Calculate water, brake, and motor horsepower for chemical pumps.
	29.10 Calculate force.
	29.11 Calculate sedimentation and loading rates.
	29.12 Use calculations to determine activated sludge characteristics.
	29.13 Use calculations to determine sludge digestion characteristics.
	29.14 Use a variety of problem-solving strategies such as drawing a diagram, making a chart, guessing-and-checking, solving a simpler problem, writing an equation working backwards, and creating a table.
30.0	Demonstrate industry specific science skills and techniques. The student will be able to:
	30.01 Differentiate between chemical and physical properties of solids, dissolved solids, gases, and liquids.
	30.02 Identify chemical symbols on the periodic table and explain their relationships.
	30.03 Interpret formula representations of molecules and compounds in water treatment.
	30.04 Characterize chemical reactions in water treatment processes for example redox, acid base, synthesis, and single and double replacement reactions.
	30.05 Utilize the mole concept and the law of conservation of mass to calculate quantities of chemicals precipitating in reactions occurring in water treatment processes.
	30.06 Describe the properties of the water molecule.
	30.07 Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH in environmental processes.
	30.08 Distinguish between endothermic and exothermic chemical processes in environmental systems.
31.0	Identify career opportunities and organizational dynamics in water resources. The student will be able to:
	31.01 Research and create a presentation about occupations in water resources.
	31.02 Determine the educational requirements and experience needed to enter and advance in water resource occupations.

CTE Standards and Benchmarks	
	31.03 Prepare a resume.
32.0	Demonstrate water treatment techniques. The student will be able to:
	32.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond.
	32.02 Identify/explain environmentally safe methods of wastewater disposal.
	32.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
	32.04 Observe different stages of construction of ponds.
33.0	Discuss an industrial pretreatment program/inspection. The student will be able to:
	33.01 Utilize spot location program.
	33.02 Survey business and industry water consumption and discharge.
	33.03 Conduct pretreatment sampling.
	33.04 Analyze data and document reports.
	33.05 Design monitoring plan.
	33.06 Monitor sites.
34.0	Discuss comprehensive quality assurance plan. The student will be able to:
	34.01 Discuss quality assurance rules.
	34.02 Develop and follow standard operating procedures.
	34.03 Describe preventative maintenance techniques.
	34.04 Describe cleaning/decontamination techniques.
	34.05 Determine accuracy and precision of sampling techniques.
	34.06 Discuss need for corrective action.
	34.07 Document Quality Assurance per regulatory agencies.

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Environmental Water Technology**
Course Number: **8007130**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of standards and regulations, site assessments, safety, managing data and physical resources, prepare a plan, perform remediation, collect and dispose of solid waste, record keeping and sampling procedures, career opportunities, leadership, teamwork, and money management concepts. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing, and observation equipment.

CTE Standards and Benchmarks	
35.0	Identify professions related to the water technology field. The student will be able to:
35.01	List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.
35.02	Identify the basic terms and concepts involved in processes used in these professions.
35.03	List potential employers in the water technology field: federal, municipal, county, state and private.
35.04	Identify resources to assist in finding employment in the field.
35.05	Identify professional organizations related to the water technology field.
35.06	Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.
36.0	Identify scientific concepts common in water and wastewater treatment. The student will be able to:
36.01	Identify chemical symbols used in water and wastewater treatment.
36.02	Describe how the hydrologic cycle is related to water treatment
36.03	Describe the basic concepts of the pH scale and its importance in the treatment process.
36.04	Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
36.05	Identify the basic nitrogen, phosphorous, and carbon cycles.
37.0	Identify safety hazards associated with water technologies. The student will be able to:

CTE Standards and Benchmarks	
	37.01 Identify the types of hazards common to water technology facilities.
	37.02 Recognize unsafe conditions and prescribe corrective measures.
	37.03 Identify and safely handle hazardous chemicals common to water technology facilities.
	37.04 Recognize electrical hazards.
	37.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.
38.0	Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	38.01 Identify the kinds of information presented on Safety Data Sheets.
	38.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).
39.0	Solve basic math problems common to water technologies. The student will be able to:
	39.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
	39.02 Identify metric measurements and perform conversions.
	39.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.
40.0	Define pumping and basic hydraulic principles. The student will be able to:
	40.01 Identify types of pumps.
	40.02 Discuss application and use of different types of pumps.
	40.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
	40.04 Identify types of pipes, valves, and fittings.
	40.05 Define cross connections.
	40.06 Identify the appropriate equipment used in the treatment processes.
41.0	Define principles of disinfection. The student will be able to:
	41.01 List the need/reasons for disinfection (list of waterborne diseases).

CTE Standards and Benchmarks	
	41.02 Define concepts related to disinfection.
	41.03 List methods and chemicals used in disinfection.
	41.04 Define the physical properties of chlorine.
	41.05 List kinds of disinfection equipment used.
42.0	Define sampling techniques. The student will be able to:
	42.01 Define the reasons for sampling and types of samples.
	42.02 Define methods of sample collection and handling, transportation, and proper disposal.
	42.03 Define the basic procedure for quality control and quality assurance in sampling.
	42.04 Define the chain of custody for samples.
	42.05 Perform chlorine residual analysis.
	42.06 Perform pH analysis.
43.0	Describe federal, state, and local regulations that apply to water technologies. The student will be able to:
	43.01 List regulatory agencies and their roles in monitoring the water technology field.
	43.02 Identify regulations associated with the appropriate federal, state, or local agencies.
	43.03 Identify training and certification requirements for water technology workers.
44.0	Demonstrate employability skills. The student will be able to:
	44.01 Conduct a job search.
	44.02 Secure information about a job.
	44.03 Identify documents that may be required for a job application.
	44.04 Complete a job application.
	44.05 Demonstrate competence in job-interview techniques.
	44.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.

CTE Standards and Benchmarks	
	44.07 Identify acceptable work habits and ethical behaviors.
	44.08 Demonstrate knowledge of how to make job changes appropriately.
	44.09 Demonstrate acceptable employee-health habits for the treatment facility environment.
	44.10 Identify materials and documents needed for a professional library.
	44.11 Demonstrate productive and positive customer interactions.
	44.12 Demonstrate effective interpersonal communication skills and leadership skills.
45.0	Identify sampling techniques and explain the significance of the steps. The student will be able to:
	45.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.
	45.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.
	45.03 Describe the laboratory test performed for the presence of bacteria.
	45.04 Describe the correct procedure for obtaining a bacteriological sample.
	45.05 Describe correct sample collection procedures for inorganic and organic analyses.
	45.06 Describe the laboratory quality-control checks and required documentation.
46.0	Identify chemical, biological, and physical constituents of water entering the water treatment facility or distribution systems. The student will be able to:
	46.01 Determine which constituents are inherent to groundwater and/or surface water.
	46.02 Describe the relationship between turbidity and the microbiological quality of water.
	46.03 Describe the uses of chemical analysis in water-treatment operations.
	46.04 Identify symbols and common names for elements and chemical compounds.
	46.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.
	46.06 Explain the importance of water treatment for the control of coliform bacteria and algae.
47.0	Describe the principles, operational and troubleshooting practices of the aeration process. The student will be able to:

CTE Standards and Benchmarks	
	47.01 Describe the aeration and air stripping processes and explain how they differ.
	47.02 Identify the types of aeration systems.
	47.03 Identify the benefits of aeration.
	47.04 Describe the components of an air-stripping system.
	47.05 Troubleshoot aeration and air stripping processes.
48.0	Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes. The student will be able to:
	48.01 Define concepts such as turbidity, color, coagulation, and flocculation.
	48.02 Define the difference between sweep and enhanced coagulation.
	48.03 Identify the kinds of equipment used in the coagulation process.
	48.04 Identify coagulant *and coagulant aid* chemicals used in water-treatment facilities.
	48.05 Identify the steps of coagulation, in order.
	48.06 Identify the specific sampling locations for process control in a coagulation process.
	48.07 Identify factors that would contribute to poor floc formation.
	48.08 Compute the feed rate in pounds per day (lbs/d) when the chemical coagulant (mg/1) and flow rate (MGD) are known.
	48.09 Compute the dosage (mg/1) of coagulant when the rate of flow (MGD) and the feed rate (lbs/day) of the chemical coagulant are known.
	48.10 Compute the dosage rate that is needed to treat a different flow (MGD) at the current dosage when the current rate of flow (MGD) and the current coagulant feed rate (lbs/d) are known.
	48.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.
49.0	Describe the principles, operational and troubleshooting practices of the sedimentation process. The student will be able to:
	49.01 Describe an upflow clarifier and basin sedimentation.
	49.02 Identify factors that contribute to efficient sedimentation.
	49.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.

CTE Standards and Benchmarks	
	49.04 Identify methods of sludge removal *and disposal* from sedimentation basins.
	49.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.
50.0	Describe the principles, operational and troubleshooting practices of the filtration process. The student will be able to:
	50.01 Describe materials and methods related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.
	50.02 Explain common problems of filtering systems, including head loss, mud balls, and filter media loss.
	50.03 Determine when to backwash a filter.
	50.04 Identify the steps for backwashing a filter.
	50.05 Describe troubleshooting techniques for filtration processes.
51.0	Describe the principles, operational and troubleshooting practices of the water-softening process. The student will be able to:
	51.01 Describe the two types of hardness.
	51.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.
	51.03 Describe alkalinity and its components.
	51.04 Identify treatment processes used for water softening.
	51.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.
	51.06 Describe selective carbonate removal.
	51.07 Identify the important zones of an upflow clarifier unit.
	51.08 Describe the lime soda ash softening process, including its control.
	51.09 Compute lime demand from raw-water analyses.
	51.10 Describe the reasons for recarbonation.
	51.11 Compute carbon dioxide demands for recarbonation.
	51.12 Compute hardness removal when the ion-exchange capacity is known.

CTE Standards and Benchmarks	
	51.13 Describe troubleshooting techniques for water-softening processes.
	51.14 Describe the ion exchange softening process
52.0	Describe the principles, operational and troubleshooting practices of the stabilization process. The student will be able to:
	52.01 Identify the chemicals used in stabilization.
	52.02 Identify two stabilization indices.
	52.03 Determine water stability, using the Langelier index and the marble test.
	52.04 Troubleshoot stabilization processes.
53.0	Describe the principles, operational and troubleshooting practices of the corrosion control process. The student will be able to:
	53.01 Identify the factors that influence corrosion.
	53.02 Describe the problems that can be created by corrosive waters.
	53.03 Describe the basic concepts related to electrolysis.
	53.04 Define electrochemical reaction.
	53.05 Identify proper maintenance *and safety* procedures for equipment chlorination.
	53.06 Describe the conditions for calcium carbonate film formation.
	53.07 Define cathode film formation.
	53.08 Define cathodic protection and describe its application in water-treatment facilities.
	53.09 Describe troubleshooting techniques for corrosion-control processes.
54.0	Describe the principles, operational and troubleshooting practices of the disinfection process. The student will be able to:
	54.01 Identify the chemicals used in primary disinfection.
	54.02 Identify commonly used chlorinators and hypochlorinators.
	54.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.
	54.04 Identify proper maintenance procedures for equipment chlorination.

CTE Standards and Benchmarks	
	54.05 Identify terminology related to chlorination and disinfection.
	54.06 Identify common safety problems or emergency situations that might occur during chlorination.
	54.07 Identify the properties of chlorine and describe its use in water treatment.
	54.08 Explain the points at which chlorine is applied most effectively in water treatment.
	54.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/1).
	54.10 Compute the feed rate (lbs/d) of a hypochlorite compound that contains a given percentage of available chlorine when given a problem where the rate of flow (MGD) and the chlorine dosage (mg/1) are known.
	54.11 Compute the new rate of flow and the feed rate that will be needed to maintain the current dosage when given the current rate of flow (MGD); the current chlorine feed rate (lbs/d), and the amount by which the rate of flow is to be increased or decreased.
	54.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.
	54.13 Describe troubleshooting techniques for disinfection processes.
55.0	Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes. The student will be able to:
	55.01 Describe the formation of total trihalomethanes (TTHM).
	55.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.
	55.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.
	55.04 Identify processes that remove trihalomethane precursors.
	55.05 Identify processes that remove trihalomethanes after they are formed.
	55.06 Identify the benefits of alternate disinfectants.
	55.07 Describe chloramination as a control of TTHM.
	55.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.
56.0	Describe the principles, operational and troubleshooting practices of the iron and manganese removal processes. The student will be able to:
	56.01 Explain the occurrence of iron and manganese in source water and in treated water.
	56.02 Describe the importance of controlling iron and manganese.

CTE Standards and Benchmarks	
	56.03 Describe sample-collection and analysis procedures for iron and manganese.
	56.04 Describe remedial processes for controlling iron and manganese.
	56.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.
	56.06 Describe troubleshooting techniques for iron and manganese-removal processes.
57.0	Describe the principles, operational and troubleshooting practices for taste and odor control. The student will be able to:
	57.01 Identify common types of complaints about water quality.
	57.02 Identify causes of tastes and odors.
	57.03 Describe how microbial growths affect tastes and odors.
	57.04 Describe how eutrophication contributes to surface-water tastes and odors.
	57.05 Describe a cross-connection.
	57.06 Identify the chemicals used in the control and treatment of tastes and odors.
	57.07 Describe the Threshold Odor Number (TON) test.
	57.08 Determine the TON when dilution volumes and positive samples are given.
	57.09 Describe troubleshooting techniques for taste and odor control.
58.0	Describe the principles, operational and troubleshooting practices of the demineralization processes. The student will be able to:
	58.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.
	58.02 Describe the structure, composition, and performance of an RO membrane.
	58.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.
	58.04 Identify items included in a typical RO-facility-operation checklist.
	58.05 Describe the common causes of membrane damage.
	58.06 Describe the procedure for membrane cleaning.
	58.07 Compute the percent of recovery when product flow and feed flow are known.

CTE Standards and Benchmarks	
	58.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.
	58.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.
	58.10 Describe the most common problem of ED operation in a facility.
	58.11 Explain how the cation membrane and the anion membrane differ.
	58.12 Describe the multi-compartment unit used in the ED process.
	58.13 Describe ED operating procedures in detail.
	58.14 Describe the two most common chemical solutions used to flush ED stack membranes.
	58.15 Describe troubleshooting techniques for demineralization processes.
59.0	Describe the principles, operational and troubleshooting practices of the fluoridation process. The student will be able to:
	59.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.
	59.02 Identify the properties of fluoride and describe its use.
	59.03 Identify the types of equipment used in fluoridation.
	59.04 Describe proper maintenance procedures for fluoridation equipment.
	59.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.
	59.06 Compute the feed rate of chemicals used in the fluoridation process.
	59.07 Describe troubleshooting techniques for the fluoridation processes.
60.0	Identify facility operational problems. The student will be able to:
	60.01 Respond to customer questions about taste or odor in the water.
	60.02 Respond to customer questions about red water or rust stains.
	60.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.
61.0	Describe basic hydraulics and pumping operations. The student will be able to:
	61.01 Describe the relationship between the system head and pressure and make conversions between them.

CTE Standards and Benchmarks	
	61.02 Describe three types of head, i.e., pressure, suction, and atmospheric.
	61.03 Describe proper operation of centrifugal and displacement pumps.
	61.04 Describe causes and methods that are effective in preventing “water hammer.”
	61.05 Troubleshoot pump operations.
62.0	Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable water facility. The student will be able to:
	62.01 Complete the Drinking Water Bacteriological Analysis Form correctly.
	62.02 Complete the DEP daily operation report (DOR) form correctly.
	62.03 Complete the DEP monthly operation report (MOR) form correctly.
	62.04 Identify the DEP requirements for the operation of standby and emergency equipment.
	62.05 Identify the DEP requirements for microbiological monitoring and analyses.
	62.06 Identify the DEP requirements for sampling and testing.
63.0	Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management. The student will be able to:
	63.01 Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.
	63.02 Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.
	63.03 Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.
	63.04 Describe proper record keeping for preventive and corrective maintenance.
	63.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management.

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Environmental Water Reclamation Technology**
Course Number: **8007210**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the area of career opportunities, scientific concepts in water treatment, safety hazards, government regulations, facility operational principles, and equipment inspections. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing, and observation equipment.

CTE Standards and Benchmarks	
64.0	Identify the basic characteristics and principles of wastewater treatment. The student will be able to:
64.01	Identify the sources of wastewater and the objectives of wastewater treatment.
64.02	Identify terms used in wastewater treatment.
64.03	Identify the impact of wastewater on receiving bodies of water.
64.04	Identify biological organisms present in treatment processes.
64.05	Identify waterborne diseases.
64.06	Identify commonly measured wastewater parameters.
64.07	Identify factors affecting raw wastewater.
64.08	Correlate treatment processes to types of facility influent and solids.
65.0	Identify sampling techniques and interpret the results. The student will be able to:
65.01	Identify the reasons for sampling and the types of samples (e.g., simple, representative, grab, composite).
65.02	Describe methods of sample collection and handling.
65.03	Identify specific samples (biological or chemical) and determine the significance of sample results required for process quality control, for compliance with standards, and for reporting.
65.04	Identify representative sampling points.

CTE Standards and Benchmarks	
	65.05 Identify the significance of the flow measurement on process control.
66.0	Describe the sources of wastewater and the types of collection systems. The student will be able to:
	66.01 Describe the types of wastewater collection systems.
	66.02 Identify flow variations and conditions that affect plant treatment, including infiltration, inflow, and lift stations.
	66.03 Identify methods to detect and correct infiltration.
	66.04 Identify dissolved gases in wastewater and the effect of their presence/absence on treatment.
67.0	Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management. The student will be able to:
	67.01 Describe concepts related to preliminary and primary treatment.
	67.02 Describe the types of preliminary treatment equipment, the way they function, and the relationship of each to the treatment train.
	67.03 Describe the types of primary treatment equipment, the way they function, and the relationship of each to the treatment train.
	67.04 Describe concepts related to secondary treatment, including attached growth processes, suspended growth processes, aeration, and clarification.
	67.05 Describe the types of secondary treatment equipment, the way they function, and the relationship of each to the treatment train.
	67.06 Describe concepts related to tertiary treatment processes, including sand filtration, nitrification/denitrification, oxic/anoxic, activated carbon, and artificial wetlands.
	67.07 Describe the types of tertiary treatment equipment, the way they function, and the relationship of each to the treatment train.
	67.08 Describe concepts related to disinfection and effluent disposal, including surface water, reuse reclamation, deep well, and ocean outfall.
	67.09 Describe the types of disinfection and the types of effluent-disposal equipment, the way they function, and the relationship of each to the system.
	67.10 Describe concepts related to solids management, including thickening, aerobic and anaerobic digestion, stabilization, de-watering, and reuse.
	67.11 Describe the types of solids-management equipment, the way they function, and the relationship of each to the system.
68.0	Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management. The student will be able to:
	68.01 Describe the grit-removal process and the operational efficiency of each step.
	68.02 Describe the laboratory tests performed on influent.

CTE Standards and Benchmarks	
68.03	Describe the primary-clarifier removal efficiencies, including settleable solids, suspended solids, total solids, BOD, and bacteria.
68.04	Describe sampling points, frequency of sampling, and the laboratory tests and results that are used for the proper operation of the primary clarifier.
68.05	Select and plot on a trend chart the parameters for primary clarification.
68.06	Use the operational data required to evaluate the performance of secondary-treatment processes, including attached growth, suspended growth, aeration, and clarification.
68.07	Describe sampling points, the frequency of sampling, and the laboratory tests and results used for proper operation of the secondary-treatment processes.
68.08	Select and plot on a trend chart the parameters for secondary clarification.
68.09	Describe how nitrification affects secondary processes and clarification.
68.10	Describe how denitrification affects secondary processes and clarification.
68.11	Use operational data to evaluate the performance of sand filtration.
68.12	Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of sand filtration. Select and plot on a trend chart the parameters for sand filtration.
68.13	Use operational data to evaluate the nitrification/denitrification process.
68.14	Use operational data to evaluate the performance of effluent-disposal processes, including disinfection and dechlorination.
68.15	Describe sampling points, the frequency of sampling, and the laboratory tests used for checking the proper operation of effluent disposal.
68.16	Select and plot on a trend chart the parameters for effluent disposal.
68.17	Describe various methods of effluent disinfection including UV, chlorination, and ozonation.
68.18	Describe the chemical and physical properties of chlorine, and describe the reactions of chlorine with water, ammonia compounds, and sulfides.
68.19	Describe the safe storage and handling of chlorine, including the use of testing compounds.
68.20	Explain the points of application of chlorine in wastewater treatment.
68.21	Describe the methods of dechlorination.
68.22	Describe the methods commonly used to dispose of wastewater effluents, including reuse applications.
68.23	Describe the laboratory tests commonly used on the reuse of effluent.

CTE Standards and Benchmarks	
	68.24 Describe the types of sludge and their characteristics.
	68.25 Use operational data to evaluate the performance of solids management, including sludge thickening, digestion, de-watering, and disposal processes.
	68.26 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of solids management and for compliance with Chapter 62-640, F.A.C.
69.0	Identify and correct facility operational problems. The student will be able to:
	69.01 Describe common facility operational problems in the treatment train, effluent disposal, and solids management.
	69.02 Describe methods to evaluate operational problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
	69.03 Select appropriate corrective actions for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
	69.04 Describe the methods for monitoring results of corrective action taken for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
70.0	Identify appropriate federal, state, and local regulations. The student will be able to:
	70.01 Identify federal, state and local regulations that apply to the operation of a wastewater-treatment facility.
	70.02 Describe the operator's duties and responsibilities, certification requirements, testing, renewal, staffing, and facility classification (sections of Chapter 62-602, F.A.C.).
	70.03 Explain and describe the contents of an operating permit.
	70.04 Identify state regulations that apply to procedures such as reclaimed water, reuse, and residuals management.
71.0	Describe federal, state and local laws for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	71.01 Identify the kinds of information presented on the SDS.
	71.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).
	71.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
	71.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org .

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Principles of Agribusiness and Management**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8009100
CIP Number	0101010200
Grade Level	9-12
Program Length	3 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	11-9013 -- Farmers, Ranchers, and Other Agricultural Managers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this program is to serve as a supplemental program to provide Agriculture, Food, and Natural Resource Education students with the opportunity, to learn the business side of agriculture commodities as well as essential functions of leadership and management.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit		3	EQ
8009110	Agriculture Leadership & Management		1 credit	11-9013		CT
8009120	Principles of Agribusiness		1 credit	11-9013	3	EC

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Agriculture Leadership & Management

09.0 Compare and contrast differing theories of leadership styles.
10.0 Develop personal leadership qualities.
11.0 Associate leadership styles for specific situations.
12.0 Establish a clear image of what the future of the organization should look like.
13.0 Acquire the skills necessary to complete a project as a team.
14.0 Build a constituency through listening, coaching, understanding and appreciating others.
15.0 Conduct professional and personal activities based on ethical reasoning.
16.0 Demonstrate personal awareness of community relations.
17.0 Pursue learning and growth opportunities related to professional and personal aspirations.
18.0 Interact with others in a manner that respects the differences of a diverse and changing society.
19.0 Develop awareness and apply skills necessary for achieving career success.
20.0 Demonstrate the effective application of reasoning, thinking, and coping skills to solve problems.
21.0 Demonstrate leadership opportunities available in FFA.
22.0 Prepare documents and skills for pursuing career success.

Principles of Agribusiness

23.0 Explain the components of the American business system.
24.0 Analyze the basic concepts of agribusiness.
25.0 Evaluate the importance of the food and fiber system to understand the impact on global economy.
26.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.
27.0 Compose and analyze a business plan for an enterprise.
28.0 Prepare and maintain all files needed to accomplish effective record keeping.
29.0 Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.
30.0 Maintain and interpret financial information (income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses.

31.0 Conduct appropriate market and marketing research.
32.0 Develop a marketing plan.
33.0 Develop specific tactics to market AFNR products and services.
34.0 Develop a production and operational plan.
35.0 Apply appropriate management skills to organize a business.
36.0 Summarize the changes in American agricultural cooperatives from their beginning to today.
37.0 Differentiate between agricultural cooperative principles and practices.
38.0 Explain the responsibilities of people involved with agriculture cooperatives.
39.0 Explain the benefits and limitations of agricultural cooperatives.
40.0 Describe the various organization that serve agricultural cooperatives.
41.0 Construct a plan for financing and taxation within an agricultural cooperative.
42.0 Explain the steps for starting an agricultural cooperative.
43.0 Validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education.
44.0 Complete a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education.
45.0 Interpret and apply state and federal rules and regulations to enterprise.
46.0 Perform accounting activities.
47.0 Perform communication activities.
48.0 Demonstrate an understanding of legal and ethical issues in a business environment.
49.0 Develop financial literacy skills.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Agriculture Leadership & Management**
Course Number: **8009110**
Course Credit: **1**

Course Description:

This course provides technical skill proficiency and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills and occupation-specific skills, and knowledge of all aspects of leadership and careers within the Agriculture, Food and Natural Resources career cluster.

CTE Standards and Benchmarks		National Standards
09.0	Compare and contrast differing theories of leadership styles. The student will be able to:	
09.01	Define different types of leadership.	CRP.0.07.01.c
09.02	Research different theories of leadership.	
09.03	Determine expectations of a leader.	
09.04	Determine what type of leadership style best fits you.	CRP.09.01.02.b
09.05	Compare commonalities of differing styles of leadership.	
09.06	Analyze Maslow's hierarchy of human needs as it relates to leadership development.	
09.07	Analyze motivation necessary for a leader as it relates to perception, judgment and groups.	
10.0	Develop personal leadership qualities. The student will be able to:	
10.01	Define personal leadership.	
10.02	Develop personal responsibility in leadership.	
11.0	Associate leadership styles for specific situations. The student will be able to:	
11.01	Define situational leadership.	CRP.09.01.02.a
11.02	Identify the different types of problem solving models and their applicability to specific situations.	CRP.02.01.01.c

CTE Standards and Benchmarks		National Standards
	11.03 Select the best leadership style for a given situation.	
12.0	Establish a clear image of what the future of the organization should look like. The student will be able to:	
	12.01 Utilize visioning skills to develop a plan.	
	12.02 Develop vision statements and plans for an organization.	
	12.03 Analyze the risks and rewards of new experiences.	
	12.04 Conduct a self-evaluation for personal reactions to new experiences.	
	12.05 Describe techniques used to build consensus.	
	12.06 Lead a meeting or activity that engages all participants in the process.	
13.0	Acquire the skills necessary to complete a project as a team. The student will be able to:	
	13.01 Discuss stages of group dynamics (e.g., Inclusion, control, and intimacy).	
	13.02 Create a task analysis.	
	13.03 Create measurable short term, intermediate and long term goals.	
	13.04 Set personal goals using the SMART goals method (Specific, Measurable, Approved by you, Realistic, Time-stamped).	
	13.05 Assess the physical, financial and professional risks associated with a particular task.	
	13.06 Facilitate the movement of team members through the stages of group development.	
	13.07 Evaluate the strengths/talents of team members needed to achieve a desired task.	CRP.12.02.01.b
	13.08 Delegate project parts equitably amongst team members to achieve a given task.	CRP.12.02.01.a
	13.09 Use a variety of strategies to evaluate goals (e.g., observe, apply, and demonstrate).	
	13.10 Identify characteristics of effective teams.	CRP.12.01.01.c
14.0	Build a constituency through listening, coaching, understanding and appreciating others. The student will be able to:	
	14.01 Demonstrate human relation skills including compassion, empathy, unselfishness, trustworthiness, reliability and being friendly to co-workers.	

CTE Standards and Benchmarks		National Standards
	14.02 Use communication (verbal and non-verbal) skills to collaborate in a group setting.	CRP.04.01.01.b
	14.03 Formulate a strategy in a conflict management plan that responds to obstacles.	
	14.04 Describe the role and purpose of a personal mentor.	
	14.05 Synthesize strategies to successfully coach/mentor others. (e.g., Building trust, praising, reprimanding).	
	14.06 Identify strategies for motivating others.	
15.0	Conduct professional and personal activities based on ethical reasoning. The student will be able to:	
	15.01 Explain a personal decision where integrity played a role in the decision.	
	15.02 Compare and contrast the benefits of living by positive ethical choices.	
	15.03 Analyze the causes for team members to accept or reject responsibility.	
	15.04 Explain the benefits of mutual respect.	
	15.05 Differentiate between habits, practices and behaviors consistent with principles of self-discipline.	
	15.06 Evaluate professional and personal values and how they are applied in the service to others.	
16.0	Demonstrate personal awareness of community relations. The student will be able to:	
	16.01 Analyze the impact of trends and issues on the community.	
	16.02 Articulate current issues that are important to the local, state, national and global communities.	
	16.03 Identify civic leadership role opportunities.	
	16.04 Demonstrate responsible citizenship.	
	16.05 Perform leadership tasks associated with citizenship.	
	16.06 Explain benefits and challenges of working in a diverse group.	
	16.07 Engage in activities to help develop personal awareness of diversity.	
	16.08 Plan an activity that promotes appreciation of diversity.	
17.0	Pursue learning and growth opportunities related to professional and personal aspirations. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	17.01 Explain the reasons for having a leadership/personal growth plan.	
	17.02 Develop a plan that includes specific goals for leadership and personal growth.	
	17.03 Explain the importance of self-concept.	
	17.04 Use problem solving strategies to solve a professional or personal issue.	CRP.02.02.01.c CRP.02.02.02.c
	17.05 Use various emerging technologies to enhance a program or project.	
	17.06 Describe the value of being a life-long learner and the need for continuous development.	
18.0	Interact with others in a manner that respects the differences of a diverse and changing society. The student will be able to:	
	18.01 Discover the different cultures that exist in one's community.	
	18.02 Compare and contrast the customs of different cultures.	
	18.03 Engage in a project that educates others about different cultures from within the community.	
	18.04 Demonstrate proper conduct and appearances for diverse settings.	
	18.05 Practice personal etiquette that is respectful of your environment.	
19.0	Develop awareness and apply skills necessary for achieving career success. The student will be able to:	
	19.01 Implement a plan to achieve career goals and priorities.	
	19.02 Determine the level of acceptable non-essential actions/tasks related to a balanced personal and work life.	
	19.03 Identify employability skills for a specific career.	
	19.04 Identify successful time management strategies.	
	19.05 Develop a model for managing stress related to personal and work environments.	
20.0	Demonstrate the effective application of reasoning, thinking, and coping skills to solve problems. The student will be able to:	
	20.01 Discuss the benefits of thinking critically and creatively.	
	20.02 Demonstrate critical and creative thinking skills while completing a task.	

CTE Standards and Benchmarks		National Standards
	20.03 Analyze problems that were solved well and problems that were not solved well.	
	20.04 Implement effective problem solving strategies.	
	20.05 Discuss the skills and techniques needed to negotiate effectively.	
	20.06 Demonstrate the skills needed to negotiate with others.	
21.0	Demonstrate leadership opportunities available in FFA. The student will be able to:	
	21.01 Assess the leadership opportunities available in the leadership organization, including SAE, conferences, scholarships and travel.	
	21.02 Identify key leaders in the history of the FFA organization.	
	21.03 State the National FFA's mission, and structure.	
	21.04 Submit a proficiency award application based on your SAE.	
	21.05 Submit application for FFA degree status.	
	21.06 Participate in an FFA Career Development Event.	
22.0	Prepare documents and skills for pursuing career success. The student will be able to:	
	22.01 Complete a college/job application.	
	22.02 Write a resume.	
	22.03 Participate in a mock interview.	
	22.04 Write a sample college admission, scholarship or employment essay.	
	22.05 Complete financial aid or employment documents.	

Florida Department of Education
Student Performance Standards

Course Title: **Principles of Agribusiness**
Course Number: **8009120**
Course Credit: **1**

Course Description:

This course provides technical skill proficiency and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills and occupation-specific skills, and knowledge of all aspects of the agribusiness sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of farms and agricultural business. Subject matter includes finance, laws, labor, machinery, facilities and marketing, as well as leadership, communication, employability and human relations skills.

CTE Standards and Benchmarks	
23.0	Explain the components of the American business system. The student will be able to:
23.01	Compare different forms of business organizations.
23.02	Distinguish and identify between the characteristics of each type of market structures (monopoly, oligopoly, monopolistic competition, pure competition).
23.03	Evaluate the advantages and disadvantages provided by each business method.
23.04	Research the factors that contribute to the four phases of the business cycle (peak, contraction – unemployment, trough, expansion – inflation).
23.05	Determine how changes in government legislation (spending, taxation, regulations, subsidies, etc.) can affect American businesses and the national debt.
23.06	Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.
24.0	Analyze the basic concepts of agribusiness. The student will be able to:

CTE Standards and Benchmarks	
	24.01 Explain the following concepts: • business cycle • profit / loss • competition • supply/ demand • quantity supplied – graphically illustrate situations that would cause change • quantity demanded – graphically illustrate situations that would cause change • equilibrium price
	24.02 Identify and discuss ethical issues in agribusiness.
25.0	Evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:
	25.01 Assess the agricultural impact upon the US gross national product and the total global economy.
	25.02 Discuss the impact global trade has US agribusiness industries, including barriers and regulations.
	25.03 Compare regulations in the US to those in other countries we import from.
	25.04 Examine the use of subsidies in American agriculture.
	25.05 Research new and emerging technologies and their impact on the economy.
26.0	Examine the scope of career opportunities in and the importance of agriculture to the economy. The student will be able to:
	26.01 Evaluate and explore the agribusiness career opportunities in agriculture.
	26.02 Calculate the total educational cost of an agricultural career.
	26.03 Compare and contrast different types of student loans available for agriculture careers.
	26.04 Construct a one year budget plan for a specific career path including expenses and construction of a credit plan for purchasing a major item.
	26.05 Analyze how changes in the market and changes in product quality can affect wages and employment status.
27.0	Compose and analyze a business plan for an enterprise. The student will be able to:
	27.01 Analyze quality AFNR business plan components that have been developed using the SMART (specific, measurable, attainable, realistic and timely) format.
	27.02 Identify components of business plans and demonstrate how to write such components using the SMART format.
	27.03 Identify and observe ethical standards in planning and operating AFNR businesses.

CTE Standards and Benchmarks	
	27.04 Utilize methods of AFNR business enterprise analysis, such as SWOT (strengths, weaknesses, opportunities and threats).
28.0	Prepare and maintain all files needed to accomplish effective record keeping. The student will be able to:
	28.01 Maintain production and agribusiness records.
	28.02 Analyze records to improve efficiency and profitability of an AFNR business.
	28.03 Demonstrate understanding of inventory relative to maintaining optimal levels and calculating costs.
29.0	Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management. The student will be able to:
	29.01 Identify financial concepts associated with production and profit and compare various economic systems (traditional, market, command, mixed) in how they answer the questions 1) what to produce, 2) how to produce, 3) for whom to produce.
	29.02 Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital such as savings and investment services.
	29.03 Explain the importance of return on investment for an agribusiness enterprise.
	29.04 Analyze contracts, leases and other legal documents.
	29.05 Determine the tax structure applicable to different agribusinesses.
30.0	Maintain and interpret financial information (income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses. The student will be able to:
	30.01 Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.
	30.02 Name and explain the impact of external economic factors on an AFNR business such as inflation.
	30.03 Predict the consequences of delayed payment of expenses, prepayment of expenses and delayed receipts on a financial statement.
	30.04 Interpret and evaluate financial statements, including income statements, balance sheets and cash-flow analyses.
31.0	Conduct appropriate market and marketing research. The student will be able to:
	31.01 Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products and services and to agricultural goods in domestic and international markets including why firms engage in price and non-price competition.
	31.02 Apply benefit/cost analysis to marketing in AFNR businesses.
	31.03 Implement and evaluate marketing strategies with agricultural commodities, products and services.
	31.04 Evaluate alternative marketing strategies, such as value adding, branding and niche marketing, and propose and implement appropriate modifications to achieve AFNR business goals.

CTE Standards and Benchmarks	
	31.05 Use data to compare historical rates of return on investments with investment claims to make informed decisions and identify potential fraud.
	31.06 Explain how buyer and sellers actions can determine the rate of return on an investment.
32.0	Develop a marketing plan. The student will be able to:
	32.01 Identify the purpose, components and developmental processes of marketing plans.
	32.02 Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources.
	32.03 Establish marketing plan goals/objectives, including monitoring, measuring and analyzing goal achievement.
33.0	Develop specific tactics to market AFNR products and services. The student will be able to:
	33.01 Explain the meaning and use of the four Ps (product, price, place and promotion) in marketing.
	33.02 Develop advertising campaigns that promote products and services.
	33.03 Implement sales goals and incentive programs and identify pricing strategies used by competitors.
34.0	Develop a production and operational plan. The student will be able to:
	34.01 Prepare a flowchart that shows production processes, including the resources and capital needed for each step and graphically explain how to determine prices and output though marginal cost analysis.
	34.02 Develop and implement a product supply and distribution plan that meets the goals and objectives of an AFNR business.
	34.03 Develop a production facility plan that includes building, equipment, personnel, utilities and logistics components.
35.0	Apply appropriate management skills to organize a business. The student will be able to:
	35.01 Identify organizational structures and chains of command in AFNR businesses.
	35.02 Identify management types in AFNR businesses.
	35.03 Determine appropriate human resources for AFNR businesses.
	35.04 Identify usual employee benefits and wages in AFNR businesses.
36.0	Summarize the changes in American agricultural cooperatives from their beginning to today. The student will be able to:
	36.01 Describe the basis for the original formation of agricultural cooperatives and how they were organized.

CTE Standards and Benchmarks	
	36.02 Construct a timeline of important dates involved with cooperatives that includes highlights contributions of entrepreneurs, inventors, and other key individuals in the development of agriculture cooperatives.
37.0	Differentiate between agricultural cooperative principles and practices. The student will be able to:
	37.01 Identify and describe the Rochdale Principles.
	37.02 Examine and simplify the seven traditional principles and practices of cooperatives.
	37.03 Explain the contemporary principles of a cooperative.
38.0	Explain the responsibilities of people involved with agriculture cooperatives. The student will be able to:
	38.01 Understand and explain the responsibilities of members in a cooperative.
	38.02 Understand and explain the responsibilities of the board of directors in a cooperative.
	38.03 Understand and explain the responsibilities of a manager in a cooperative.
	38.04 Understand and explain the responsibilities of an employee in a cooperative.
39.0	Explain the benefits and limitations of agricultural cooperatives. The student will be able to:
	39.01 Understand and evaluate the benefits of being a cooperative member.
	39.02 Compare and contrast the successes and failures of a cooperative.
	39.03 Evaluate the importance of knowing the benefits and successes/failures of a cooperative.
40.0	Describe the various organization that serve agricultural cooperatives. The student will be able to:
	40.01 Identify and evaluate the different cooperatives involved in communities.
	40.02 Identify and evaluate the organizations that serve cooperatives.
41.0	Construct a plan for financing and taxation within an agricultural cooperative. The student will be able to:
	41.01 Explain the difference between the two forms of capital debt and equity.
	41.02 Explain how equity capital is provided.
	41.03 Describe the various ways a cooperative can obtain borrowed capital.
	41.04 Explain the single-tax principle and how it works for cooperatives and differentiate between direct and indirect taxes and describe the

CTE Standards and Benchmarks	
	progressivity of taxes.
42.0	Explain the steps for starting an agricultural cooperative. The student will be able to:
42.01	Become familiar with the basic legal and financial documents needed to operate a cooperative business.
42.02	Learn how a cooperative business functions and operates.
43.0	Validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education. The student will be able to:
43.01	Acquire and demonstrate communication skills such as writing, public speaking and listening while refining oral, written and verbal skills.
43.02	Recognize and explain the role of the FFA in the development of leadership, education, employability, communications and human relations skills.
43.03	Examine roles within teams, work units, departments, organizations, inter-organizational systems and the larger environment.
43.04	Acquire the skills necessary to positively influence others.
44.0	Complete a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education. The student will be able to:
44.01	Explain the nature of and become familiar with those terms related to an SAE program.
44.02	Explore the numerous possibilities for an SAE program which a student might develop.
44.03	Develop an individual SAE program and implement record keeping skills.
44.04	Compose an FFA Proficiency Application or State Degree Application.
45.0	Interpret and apply state and federal rules and regulations to enterprise. The student will be able to:
45.01	List agencies responsible for inspecting and regulating operation or product.
45.02	Investigate EPA, DEP and FDAC environmental policies.
45.03	Determine the impact of water restriction on agribusiness operations.
45.04	Maintain a file of current rules and regulations relative to operation.
45.05	List reasons for the necessity of inspections, certification and regulations.
45.06	Diagram and explain the problems that occur when government institutes wage and price controls and explain the rational for these controls

CTE Standards and Benchmarks	
46.0	Perform accounting activities. The student will be able to:
46.01	Prepare a balance sheet.
46.02	Prepare a cash flow statement.
46.03	Demonstrate knowledge of checking account records and bank reconciliation.
46.04	Interpret financial statements.
46.05	Demonstrate knowledge of the accounting cycle.
46.06	Create and interpret a budget for one year.
46.07	Establish a plan to pay off debt.
46.08	Calculate and record depreciation, net worth and income.
46.09	Explain cash management strategies including debit accounts, checking accounts and savings accounts.
46.10	Analyze credit scores and reports and there uses.
46.11	Complete a profit and loss statement.
46.12	Calculate the finance charges and total amount due on a credit card bill; include any fees that could be included.
46.13	Examine inflation, its effects on interest, value of goods and services, and employment.
46.14	Analyze consequences for not repaying a loan or having missing/late payments on loans or credit cards.
46.15	Compare different tax models at the federal, state and local level.
47.0	Perform communication activities. The student will be able to:
47.01	Compose business correspondence and related documents and demonstrate correct spelling, grammar, punctuation and work choice.
47.02	Prepare visual material, including electronic media, to support an oral presentation.
47.03	Demonstrate ability to communicate effectively with diverse populations.
48.0	Demonstrate an understanding of legal and ethical issues in a business environment. The student will be able to:
48.01	Demonstrate understanding of intellectual property rights.

CTE Standards and Benchmarks	
	48.02 Demonstrate understanding of appropriate use of employer property.
	48.03 Demonstrate understanding of confidentiality.
	48.04 Demonstrate understanding of role of ethical decision making in dealing with stakeholders.
	48.05 Demonstrate knowledge of legal and privacy issues regarding e-mail, voice mail, internet, telephone and other communication methods.
	48.06 Explain regulations or laws that are put in place to regulate financial institutions and protect business or consumers.
49.0	Develop financial literacy skills. The student will be able to:
	49.01 Analyze types of loans, including the importance of down payments and collateral on securing funding sources.
	49.02 Calculate the effects on the monthly payment in the change of interest rate based on an adjustable rate mortgage.
	49.03 Analyze diversification in investments.
	49.04 Explain the risk benefit in investment areas.
	49.05 Analyze stock with a set amount of money, and follow the process through gains, losses and selling.
	49.06 Compare and contrast income from purchase of common stock, preferred stock and bonds.
	49.07 Given current exchange rates be able to convert from one form of currency to another.
	49.08 Compare different insurance options and fees.
	49.09 Compare and contrast the role of insurance as a device to mitigate risk and calculate expenses of various options.
	49.10 Collect, organize, and interpret data to determine an effective retirement savings plan to meet personal financial goals.
	49.11 Calculate, compare, and contrast different types of retirement plans, including IRAs, ROTH accounts and annuities.
	49.12 Discuss when bankruptcy should be used as an action and the repercussions involved with filing.
	49.13 Determine how identity theft can occur and what assistance is in in place for victims.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.\

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Floral Design and Marketing**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8012100
CIP Number	0201060801
Grade Level	9-12
Program Length	4 credits
Teacher Certification	Refer to **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	41-2031 -- Retail Salespersons 27-1023 -- Floral Designers 41-1011 -- First-Line Supervisors of Retail Sales Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning and preparing floral designs, selling, buying, transporting, storing, advertising, displaying, and managing the floral goods and services industry.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.
To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8012110	Introduction to Floral Design 1	AGRICULTUR 1 @2 AGRICULTUR 7G Retailing@7 7G MKTG 1	1 credit	27-1023	2	CT
8012120	Floral Design 2		1 credit	27-1023	2	CT
8012130	Floral Design and Marketing Services 3		1 credit	41-2031	2	CT
8012140	Floral Design and Management 4		1 credit	41-1011	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Introduction to Floral Design 1

01.0 Discuss the floral design and marketing industry.
02.0 Demonstrate the application of post-harvest care and handling of floral products.
03.0 Identify procedures for creating floral designs.
04.0 Identify mechanical components of floral design.
05.0 Demonstrate knowledge in non-floral and gift packaging.
06.0 Identify procedures to create fresh and permanent floral designs.
07.0 Demonstrate effective communication skills.

Floral Design 2

08.0 Apply techniques for post-harvest care and handling of floral products.
09.0 Create fresh and permanent floral designs.
10.0 Demonstrate order processing skills.
11.0 Perform merchandising operations unique to floral marketing.
12.0 Apply sales techniques and procedures to the marketing of floral products.

Floral Design and Marketing Services 3

13.0 Create designs for live plants.
14.0 Identify factors for the promotion of florist store products and services.
15.0 Demonstrate knowledge of merchandising activities.
16.0 Apply sales promotion techniques and procedures to the marketing of floral products.

Floral Design and Management 4

17.0 Create fresh and permanent special occasion floral pieces.
18.0 Create fresh and/or permanent sympathy designs.
19.0 Create fresh and/or permanent wedding designs.
20.0 Demonstrate distribution skills involved in floral marketing.
21.0 Identify factors to consider when opening/managing a floral business.
22.0 Demonstrate an understanding of the functions of management.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Floral Design 1**
Course Number: **8012110**
Course Credit: **1**

Course Description:

This course is designed to develop the fundamental competencies necessary for employment in the floral design industry. Topics include: introduction to the floral industry, safety regulations, mechanical components of design, history of design, and basic floral design techniques.

CTE Standards and Benchmarks	
01.0	Discuss the floral design and marketing industry. The student will be able to:
01.01	Identify careers in the floral design and marketing industry.
01.02	Describe trends in the floral design and marketing industry.
01.03	Explain floral services.
01.04	Discuss global floral sourcing.
02.0	Demonstrate the application of post-harvest care and handling of floral products. The student will be able to:
02.01	Identify safety procedures.
02.02	Identify varieties of flowers and plants utilized in floral arrangements.
02.03	Perform specialized care and handling of flowers and plants utilized in floral arrangements.
02.04	Store plants, flowers, and prepared floral arrangements according to established procedures.
02.05	Demonstrate maintenance of fresh flowers and foliage.
03.0	Identify procedures and creating floral designs. The student will be able to:
03.01	Identify and practice safety procedures.
03.02	Identify fundamentals of the elements of design.
03.03	Identify principles of design.

CTE Standards and Benchmarks	
	03.04 Apply fundamentals of creativity.
	03.05 Identify, use, and maintain hand tools and equipment.
	03.06 Select appropriate containers based on mechanics of design.
04.0	Identify mechanical components of floral design. The student will be able to:
	04.01 Demonstrate proper wiring techniques.
	04.02 Demonstrate appropriate use of floral oasis.
	04.03 Create different types of bows.
	04.04 Select containers for specific designs.
	04.05 Demonstrate proper use of a helium tank.
05.0	Demonstrate knowledge in non-floral and gift packaging. The student will be able to:
	05.01 Create balloon arrangements.
	05.02 Identify mechanics of gift baskets.
	05.03 Construct presentation of non-floral and packaging items.
	05.04 Create a non-floral product.
06.0	Identify procedures to create fresh and permanent floral designs. The student will be able to:
	06.01 Create geometric designs.
	06.02 Create horizontal and vertical designs.
	06.03 Create symmetrical and asymmetrical designs.
	06.04 Create personal flowers to wear.
	06.05 Apply principles of mass production skills.
07.0	Demonstrate effective communication skills. The student will be able to:
	07.01 Discuss the role of communications in marketing.

CTE Standards and Benchmarks
07.02 Demonstrate a proficiency in the effective use of speech and vocabulary.
07.03 Demonstrate effective written communication skills.
07.04 Demonstrate effective oral communication skills.
07.05 Demonstrate effective listening skills.

Florida Department of Education
Student Performance Standards

Course Title: **Floral Design 2**
Course Number: **8012120**
Course Credit: **1**

Course Description:

This course prepares the student in the skills of merchandising math, pricing, and selling. In addition the course includes skills for ordering fresh and silk flowers, maintaining stock, receiving and processing wholesale and retail sales orders, pricing stock, and utilizing appropriate sales techniques and customer relations.

CTE Standards and Benchmarks	
08.0	Apply techniques for post-harvest care and handling of floral products. The student will be able to:
08.01	Discuss operation of underwater floral cutting equipment.
08.02	Discuss use of electric floral stem stripper.
08.03	Apply knowledge in the use of floral preservatives and pre-hydrating solutions.
08.04	Demonstrate knowledge and application of refrigeration, sanitation, and ethylene control.
08.05	Identify grower-packaging quantities used for cut flowers and foliage.
08.06	Apply knowledge of specialized techniques for conditioning post-harvest plant material.
08.07	Discuss the benefits of chain of life.
09.0	Create fresh and permanent floral designs. The student will be able to:
09.01	Identify and create advanced geometric designs.
09.02	Identify design styles.
09.03	Apply knowledge of the color wheel.
09.04	Apply use of color harmonies.
09.05	Describe differences in period design.

CTE Standards and Benchmarks	
	09.06 Create seasonal arrangements.
10.0	Demonstrate order processing skills. The student will be able to:
	10.01 Tag floral orders.
	10.02 Package products.
	10.03 Price orders.
11.0	Perform merchandising operations unique to floral marketing. The student will be able to:
	11.01 Demonstrate correct procedures for handling customer sales transactions.
	11.02 Explain pricing policies.
	11.03 Calculate mark-up of floral products.
	11.04 Describe opening and closing procedures for a floral operation.
12.0	Apply sales techniques and procedures to the marketing of floral products. The student will be able to:
	12.01 Demonstrate steps of a sale utilizing floral products.
	12.02 Perform telephone sales.
	12.03 Distinguish between a local, incoming, and outgoing order.
	12.04 Demonstrate the process of using both telephone and computer wire service.

Florida Department of Education
Student Performance Standards

Course Title: **Floral Design and Marketing Services 3**
Course Number: **8012130**
Course Credit: **1**

Course Description:

This course prepares the student to market floral designs. Content includes construction and use of display items, sales promotions, and inventory control. Content will also help build team building skills, and build critical thinking skills.

CTE Standards and Benchmarks	
13.0	Create designs for live plants. The student will be able to:
13.01	Construct dish gardens
13.02	Decorate blooming plants.
14.0	Identify factors for the promotion of florist store products and services. The student will be able to:
14.01	Identify the major classifications of retail flower operations.
14.02	Describe product presentation and importance of window and store display.
14.03	Identify primary goals of display.
15.0	Demonstrate knowledge of merchandising activities. The student will be able to:
15.01	Explain the role of buying and purchasing in a retailing situation.
15.02	Follow accepted procedures for inventory control.
15.03	Demonstrate stock-keeping procedures.
15.04	Operate appropriate weighing and measuring devices for floral products and materials.
16.0	Apply sales promotion techniques and procedures to the marketing of floral products. The student will be able to:
16.01	Discuss the purposes of advertising, display, and public relations.
16.02	Explain the importance of sales promotion.

CTE Standards and Benchmarks
16.03 Identify various forms of advertising media including the Internet
16.04 Plan and present a sales promotion for a product.

Florida Department of Education
Student Performance Standards

Course Title: **Floral Design and Management 4**
Course Number: **8012140**
Course Credit: **1**

Course Description:

This course prepares the student with basic skills in specialty designs, weddings, funerals, and special events. The course allows the students opportunities to use creative concepts to create floral designs and personal pieces, beginning management and business skills are also part of the course.

CTE Standards and Benchmarks	
17.0	Create fresh and permanent special occasion floral pieces. The student will be able to:
17.01	Create unique corsages & boutonnieres.
17.02	Create seasonal/holiday designs.
17.03	Create special event pieces: conventions, parties, banquets, showers, and receptions.
18.0	Create fresh and/or permanent sympathy designs. The student will be able to:
18.01	Create a casket spray.
18.02	Create funeral baskets.
18.03	Create set pieces (using manufactured form).
18.04	Create easel pieces.
18.05	Create interior lid pieces.
18.06	Create a non-traditional memorial design.
18.07	Conduct a funeral consultation.
19.0	Create fresh and/or permanent wedding designs. The student will be able to:
19.01	Create designs for church/synagogue weddings.
19.02	Create designs for theme weddings.

CTE Standards and Benchmarks	
	19.03 Create designs for wedding receptions.
	19.04 Design a bridal bouquet.
	19.05 Create designs for wedding party members.
	19.06 Conduct a wedding consultation.
20.0	Demonstrate distribution skills involved in floral marketing. The student will be able to:
	20.01 Route and organize deliveries according to priority, location, and time.
	20.02 Make confirmation phone calls.
	20.03 Maintain general floral shop upkeep.
21.0	Identify factors to consider when opening/managing a floral business. The student will be able to:
	21.01 Identify primary functions of a retail flower shop.
	21.02 Explain the characteristics of store location options.
	21.03 Characterize the principle responsibilities of employees.
	21.04 Summarize the key management responsibilities required for a successful and profitable flower shop.
22.0	Demonstrate an understanding of the functions of management. The student will be able to:
	22.01 Identify and describe steps in the planning process.
	22.02 Define Management by Objectives (MBO).
	22.03 Develop an organizational chart to illustrate line and staff relationships.
	22.04 Describe the responsibilities for selecting, training, and appraising employees.
	22.05 Define the principles of “chain of command” and “span of control.”
	22.06 Justify the importance of accountability.
	22.07 Name and define the functions of management (planning, organizing, staffing, directing, controlling).
	22.08 Explain how motivation, leadership, and communication influence people within an organization.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Course Title: **Introduction to Agriculture, Food, & Natural Resources**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food, and Natural Resources**

Secondary – Middle School	
Course Number	8021100
CIP Number	148021110M
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8021100	Introduction to Agriculture, Food, & Natural Resources	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate an understanding of the Food Products & Processing Systems career pathway.
02.0 Demonstrate an understanding of the Plant Systems career pathway.
03.0 Demonstrate an understanding of the Animal Systems career pathway.
04.0 Demonstrate an understanding of the Power, Structure, and Technical Systems career pathway.
05.0 Demonstrate an understanding of the Natural Resource Systems career pathway.
06.0 Demonstrate an understanding of the Environmental Service Systems career pathway.
07.0 Demonstrate an understanding of the Agribusiness Systems career pathway.
08.0 Apply leadership and communication skills.
09.0 Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster.
10.0 Use information technology tools.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Agriculture, Food, & Natural Resources**
Course Number: **8021100**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the Agriculture, Food, and Natural Resources career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Food Products & Processing Systems career pathway. The student will be able to:
01.01	Define and use proper terminology associated with the Food Products & Processing Systems career pathway.
01.02	Describe some of the careers available in the Food Products & Processing Systems career pathway.
01.03	Identify common characteristics of the careers in the Food Products & Processing Systems career pathway.
01.04	Research the history of the Food Products & Processing Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Food Products & Processing Systems career pathway.
01.06	Describe technologies associated in careers within the Food Products & Processing Systems career pathway.
02.0	Demonstrate an understanding of the Plant Systems career pathway. The student will be able to:
02.01	Define and use proper terminology associated with the Plant Systems career pathway.
02.02	Describe some of the careers available in the Plant Systems career pathway.
02.03	Identify common characteristics of the careers in the Plant Systems career pathway.
02.04	Research the history of the Plant Systems career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Plant Systems career pathway.
02.06	Describe technologies associated in careers within the Plant Systems career pathway.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the Animal Systems career pathway. The student will be able to:
03.01	Define and use proper terminology associated with the Animal Systems career pathway.
03.02	Describe some of the careers available in the Animal Systems career pathway.
03.03	Identify common characteristics of the careers in the Animal Systems career pathway.
03.04	Research the history of the Animal Systems career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Animal Systems career pathway.
03.06	Describe technologies associated in careers within the Animal Systems career pathway.
04.0	Demonstrate an understanding of the Power, Structural and Technological Systems career pathway. The student will be able to:
04.01	Define and use proper terminology associated with the Power, Structural and Technological Systems career pathway.
04.02	Describe some of the careers available in the Power, Structural and Technological Systems career pathway.
04.03	Identify common characteristics of the careers in the Power, Structural and Technological Systems career pathway.
04.04	Research the history of the Power Structural and Technological Systems career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Power Structural and Technological Systems career pathway.
04.06	Describe technologies associated in careers within the Power Structural and Technological Systems career pathway.
05.0	Demonstrate an understanding of the Natural Resource Systems career pathway. The student will be able to:
05.01	Define and use proper terminology associated with the Natural Resource Systems career pathway.
05.02	Describe some of the careers available in the Natural Resource Systems career pathway.
05.03	Identify common characteristics of the careers in the Natural Resource Systems career pathway.
05.04	Research the history of the Natural Resource Systems career pathway and describe how the careers have evolved and impacted society.
05.05	Identify skills required to successfully enter any career in the Natural Resource Systems career pathway.
05.06	Describe technologies associated in careers within the Natural Resource Systems career pathway.

CTE Standards and Benchmarks	
06.0	Demonstrate an understanding of the Environmental Service Systems career pathway. The student will be able to:
06.01	Define and use proper terminology associated with the Environmental Service Systems career pathway.
06.02	Describe some of the careers available in the Environmental Service Systems career pathway.
06.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
06.04	Research the history of the Environmental Service Systems career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Environmental Service Systems career pathway.
06.06	Describe technologies associated in careers within the Environmental Service Systems career pathway.
07.0	Demonstrate an understanding of the Agribusiness Systems career pathway. The student will be able to:
07.01	Define and use proper terminology associated with the Agribusiness Systems career pathway.
07.02	Describe some of the careers available in the Agribusiness Systems career pathway.
07.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
07.04	Research the history of the Agribusiness Systems career pathway and describe how the careers have evolved and impacted society.
07.05	Identify skills required to successfully enter any career in the Agribusiness Systems career pathway.
07.06	Describe technologies associated in careers within the Agribusiness Systems career pathway.
08.0	Apply leadership and communication skills. The student will be able to:
08.01	Discuss the establishment and history of the FFA organization.
08.02	Identify the characteristics and responsibilities of organizational leaders.
08.03	Demonstrate parliamentary procedure skills during a meeting.
08.04	Participate on a committee which has an assigned task and report to the class.
08.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
08.06	Use a computer to assist in the completion of project related to the Agriculture, Food, & Natural Resources career cluster.

CTE Standards and Benchmarks	
09.0	Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster. The student will be able to:
09.01	Identify information technology (IT) careers in the Agriculture, Food & Natural Resources career cluster, including the responsibilities, tasks and skills they require.
09.02	Relate information technology project management concepts and terms to careers in the Agriculture, Food & Natural Resources career cluster.
09.03	Manage information technology components typically used in professions of the Agriculture, Food & Natural Resources career cluster.
09.04	Identify security-related ethical and legal IT issues faced by professionals in the Agriculture, Food & Natural Resources career cluster.
10.0	Use information technology tools. The student will be able to:
10.01	Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Agriculture, Food & Natural Resources career cluster.
10.02	Use e-mail clients to send simple messages and files to other Internet users.
10.03	Demonstrate ways to communicate effectively using Internet technology.
10.04	Use different types of web search engines effectively to locate information relevant to the Agriculture, Food & Natural Resources career cluster.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Introduction to Agriculture, Food, & Natural Resources and Career Planning**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food, and Natural Resources**

Secondary – Middle School	
Course Number	8021110
CIP Number	148021100M
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8021110	Introduction to Agriculture, Food, & Natural Resources and Career Planning	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4. MG General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate an understanding of the Food Products & Processing Systems career pathway.
02.0 Demonstrate an understanding of the Plant Systems career pathway.
03.0 Demonstrate an understanding of the Animal Systems career pathway.
04.0 Demonstrate an understanding of the Power, Structure, and Technical Systems career pathway.
05.0 Demonstrate an understanding of the Natural Resource Systems career pathway.
06.0 Demonstrate an understanding of the Environmental Service Systems career pathway.
07.0 Demonstrate an understanding of the Agribusiness Systems career pathway.
08.0 Apply leadership and communication skills.
09.0 Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster.
10.0 Use information technology tools.

Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes:

11.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
12.0 Develop skills to locate, evaluate, and interpret career information.
13.0 Identify and demonstrate processes for making short and long term goals.
14.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
15.0 Understand the relationship between educational achievement and career choices/postsecondary options.
16.0 Identify a career cluster and related pathways through an interest assessment that match career and education goals.
17.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
18.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Agriculture, Food, & Natural Resources and Career Planning**
Course Number: **8021110**
Course Length: **Semester**

Course Description:

Beginning with a broad overview of the Agriculture, Food, and Natural Resources career cluster, students are introduced to the terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the Food Products & Processing Systems career pathway. The student will be able to:
01.01	Define and use proper terminology associated with the Food Products & Processing Systems career pathway.
01.02	Describe some of the careers available in the Food Products & Processing Systems career pathway.
01.03	Identify common characteristics of the careers in the Food Products & Processing Systems career pathway.
01.04	Research the history of the Food Products & Processing Systems career pathway and describe how the associated careers have evolved and impacted society.
01.05	Identify skills required to successfully enter any career in the Food Products & Processing Systems career pathway.
01.06	Describe technologies associated in careers within the Food Products & Processing Systems career pathway.
02.0	Demonstrate an understanding of the Plant Systems career pathway. The student will be able to:
02.01	Define and use proper terminology associated with the Plant Systems career pathway.
02.02	Describe some of the careers available in the Plant Systems career pathway.
02.03	Identify common characteristics of the careers in the Plant Systems career pathway.
02.04	Research the history of the Plant Systems career pathway and describe how the careers have evolved and impacted society.
02.05	Identify skills required to successfully enter any career in the Plant Systems career pathway.
02.06	Describe technologies associated in careers within the Plant Systems career pathway.

CTE Standards and Benchmarks	
03.0	Demonstrate an understanding of the Animal Systems career pathway. The student will be able to:
03.01	Define and use proper terminology associated with the Animal Systems career pathway.
03.02	Describe some of the careers available in the Animal Systems career pathway.
03.03	Identify common characteristics of the careers in the Animal Systems career pathway.
03.04	Research the history of the Animal Systems career pathway and describe how the careers have evolved and impacted society.
03.05	Identify skills required to successfully enter any career in the Animal Systems career pathway.
03.06	Describe technologies associated in careers within the Animal Systems career pathway.
04.0	Demonstrate an understanding of the Power, Structural and Technological Systems career pathway. The student will be able to:
04.01	Define and use proper terminology associated with the Power, Structural and Technological Systems career pathway.
04.02	Describe some of the careers available in the Power, Structural and Technological Systems career pathway.
04.03	Identify common characteristics of the careers in the Power, Structural and Technological Systems career pathway.
04.04	Research the history of the Power, Structural and Technological Systems career pathway and describe how the careers have evolved and impacted society.
04.05	Identify skills required to successfully enter any career in the Power, Structural and Technological Systems career pathway.
04.06	Describe technologies associated in careers within the Power, Structural, and Technological Systems career pathway.
05.0	Demonstrate an understanding of the Natural Resource Systems career pathway. The student will be able to:
05.01	Define and use proper terminology associated with the Natural Resource Systems career pathway.
05.02	Describe some of the careers available in the Natural Resource Systems career pathway.
05.03	Identify common characteristics of the careers in the Natural Resource Systems career pathway.
05.04	Research the history of the Natural Resource Systems career pathway and describe how the careers have evolved and impacted society.
05.05	Identify skills required to successfully enter any career in the Natural Resource Systems career pathway.
05.06	Describe technologies associated in careers within the Natural Resource Systems career pathway.

CTE Standards and Benchmarks	
06.0	Demonstrate an understanding of the Environmental Service Systems career pathway. The student will be able to:
06.01	Define and use proper terminology associated with the Environmental Service Systems career pathway.
06.02	Describe some of the careers available in the Environmental Service Systems career pathway.
06.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
06.04	Research the history of the Environmental Service Systems career pathway and describe how the careers have evolved and impacted society.
06.05	Identify skills required to successfully enter any career in the Environmental Service Systems career pathway.
06.06	Describe technologies associated in careers within the Environmental Service Systems career pathway.
07.0	Demonstrate an understanding of the Agribusiness Systems career pathway. The student will be able to:
07.01	Define and use proper terminology associated with the Agribusiness Systems career pathway.
07.02	Describe some of the careers available in the Agribusiness Systems career pathway.
07.03	Identify common characteristics of the careers in Environmental Service Systems career pathway.
07.04	Research the history of the Agribusiness Systems career pathway and describe how the careers have evolved and impacted society.
07.05	Identify skills required to successfully enter any career in the Agribusiness Systems career pathway.
07.06	Describe technologies associated in careers within the Agribusiness Systems career pathway.
08.0	Apply leadership and communication skills. The student will be able to:
08.01	Discuss the establishment and history of the FFA organization.
08.02	Identify the characteristics and responsibilities of organizational leaders.
08.03	Demonstrate parliamentary procedure skills during a meeting.
08.04	Participate on a committee which has an assigned task and report to the class.
08.05	Demonstrate effective communication skills through delivery of a speech, a slide presentation, or conducting a demonstration.
08.06	Use a computer to assist in the completion of project related to the Agriculture, Food, & Natural Resources career cluster.

CTE Standards and Benchmarks	
	08.07 Describe the diversity of career opportunities in agriculture and its related fields through a Foundational SAE.
09.0	Describe how information technology is used in the Agriculture, Food & Natural Resources career cluster. The student will be able to:
	09.01 Identify information technology (IT) careers in the Agriculture, Food & Natural Resources career cluster, including the responsibilities, tasks and skills they require.
	09.02 Relate information technology project management concepts and terms to careers in the Agriculture, Food & Natural Resources career cluster.
	09.03 Manage information technology components typically used in professions of the Agriculture, Food & Natural Resources career cluster.
	09.04 Identify security-related ethical and legal IT issues faced by professionals in the Agriculture, Food & Natural Resources career cluster.
10.0	Use information technology tools. The student will be able to:
	10.01 Identify the functions of web browsers, and use them to access the World Wide Web and other computer resources typically used in the Agriculture, Food & Natural Resources career cluster.
	10.02 Use e-mail clients to send simple messages and files to other Internet users.
	10.03 Demonstrate ways to communicate effectively using Internet technology.
	10.04 Use different types of web search engines effectively to locate information relevant to the Agriculture, Food & Natural Resources career cluster.
Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes: The student will be able to**:**	
11.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
12.0	Develop skills to locate, evaluate, and interpret career information.
13.0	Identify and demonstrate processes for making short and long term goals.
14.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
15.0	Understand the relationship between educational achievement and career choices/postsecondary options.
16.0	Identify a career cluster and related pathways that match career and education goals.
17.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.

CTE Standards and Benchmarks
18.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Career Planning

Effective July 1, 2019, per Section 1003.4156, Florida Statutes (F.S.), for students to meet middle grades promotion requirements, a Career and Education Planning course must be completed in either sixth, seventh, or eighth grade. These courses should be taught integrating the eight career and education planning course standards.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Fundamentals of Agriculture, Food, and Natural Resource Systems**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food, and Natural Resources**

Secondary – Middle School	
Course Number	8021300
CIP Number	148021300M
Grade Level	6-8
Course Length	year
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one year. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8021300	Fundamentals of Agriculture, Food, and Natural Resource Systems	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	year

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Summarize the evolution of production agriculture.
02.0 Differentiate between animal welfare and ethical treatment of animals
03.0 Explain skills and principles used in dairy production.
04.0 Explain skills and principles used in livestock production.
05.0 Explain skills and principles used in poultry production.
06.0 Explain skills and principles used in aquaculture production
07.0 Explain skills and principles used in vegetable production.
08.0 Investigate and demonstrate skills and principles used in nursery production.
09.0 Apply scientific and technical skills in production agriculture.
10.0 Manage leadership and communication skills
11.0 Examine good work habits, and career planning in agriculture production.
12.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in production agriculture.
13.0 Identify components of network systems.
14.0 Describe and use communication features of information technology.

Florida Department of Education
Student Performance Standards

Course Title: **Fundamentals of Agriculture, Food, and Natural Resource Systems**
Course Number: **8021300**
Course Length: **Semester**

Course Description:

The next series in the world of the Agriculture, Food, and Natural Resources career cluster, students will be engaged in activities with terminology, careers, history, required skills, and technologies associated with each pathway in the Agriculture, Food, and Natural Resources career cluster. Additionally, they will be provided with opportunities to acquire and demonstrate beginning leadership skills.

CTE Standards and Benchmarks	
01.0	Summarize the evolution of production agriculture. The student will be able to:
01.01	Describe the importance of agriculture on a world, national, state and community scale.
01.02	Distinguish the major agricultural production areas of the United States.
01.03	Distinguish agriculture products produced in Florida.
01.04	Interpret how changes in production practices, population, and land use have influenced the agriculture economy.
01.05	Demonstrate how development of new technology has affected agriculture production.
01.06	Examine the changes in agriculture careers that reflect the changes in production methods.
02.0	Differentiate between animal welfare and ethical treatment of animals. The student will be able to:
02.01	Describe the proper handling of production animals.
02.02	Compare animal welfare and animal rights.
02.03	Explain how animal welfare and animal rights advocate groups impact production agriculture.
02.04	Summarize animal cruelty and the consequences of cruel treatment of animals.
03.0	Explain skills and principles used in dairy production. The student will be able to:
03.01	Explain the difference between breeds of dairy cattle.

CTE Standards and Benchmarks	
	03.02 Demonstrate knowledge of proper health and nutrition for dairy animals.
	03.03 Explain the safety procedures used for dairy products.
	03.04 Compare different styles of dairies and milking parlors.
	03.05 Identify the varieties of dairy products and the methods of processing.
	03.06 Create a dairy product.
04.0	Explain skills and principles used in livestock production. The student will be able to:
	04.01 Compare the different breeds of livestock.
	04.02 Differentiate the different cuts and grading of meat.
	04.03 Evaluate proper health and nutrition for livestock animals.
	04.04 Demonstrate knowledge of terminology for animals based on species and condition (eg. age, sex, bred, etc…)
	04.05 Determine different reproduction methods, and the process of selective breeding.
	04.06 Explain how the use of biotechnology has impacted the livestock industry.
05.0	Explain skills and principles used in poultry production. The student will be able to:
	05.01 Compare different types of poultry and their uses in production agriculture.
	05.02 Differentiate proper techniques for classification and grading of poultry and poultry products.
	05.03 Describe proper safe handling techniques for poultry products.
	05.04 Evaluate knowledge of health and nutrition for poultry.
	05.05 Explain how the use of biotechnology has impacted the poultry industry.
06.0	Explain skills and principles used in aquaculture production. The student will be able to:
	06.01 Compare the different breeds of aquatic species.
	06.02 Evaluate proper health and nutrition for aquatic species.
	06.03 Demonstrate knowledge of terminology for aquatic species.

CTE Standards and Benchmarks	
	06.04 Determine different reproduction methods.
	06.05 Explain how the use of biotechnology has impacted the aquatic species industry.
07.0	Explain skills and principles used in vegetable production. The student will be able to:
	07.01 Produce a vegetable crop.
	07.02 Compare the components of soil.
	07.03 Perform a soil test.
	07.04 Describe how climate can affect crop production.
	07.05 Compile knowledge of growing seasons for a geographic region.
	07.06 Explain the use of Best Management Practices in crop production.
	07.07 Investigate the impact of pests on crop yields.
	07.08 Model the safety precautions on a pesticide and fertilizer label.
	07.09 Assess proper irrigation methods for crops.
	07.10 Analyze knowledge of harvesting techniques and equipment
	07.11 Compare types of storage facilities.
	07.12 Explain how the use of biotechnology has impacted vegetable crop production.
08.0	Explain skills and principles used in nursery production. The student will be able to:
	08.01 Perform plant propagation.
	08.02 Develop a growing schedule for nursery plants.
	08.03 Model methods for Integrated Pest Management.
	08.04 Compare types of growing media.
	08.05 Identify nutrients necessary for plant growth from the periodic table and their functions.
	08.06 Identify plants based on common and scientific names.

CTE Standards and Benchmarks	
	08.07 Describe principles for plant growth.
	08.08 Explain different methods of irrigation.
	08.09 Explain how the use of biotechnology has impacted plant production.
09.0	Apply scientific and technical skills in production agriculture. The student will be able to:
	09.01 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings.
	09.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications
10.0	Manage leadership and communication skills. The student will be able to:
	10.01 Discuss the establishment and history of the FFA organization.
	10.02 Compare the characteristics and responsibilities of organizational leaders.
	10.03 Demonstrate parliamentary procedure skills during a meeting.
	10.04 Participate on a committee which has an assigned task and report to the class.
	10.05 Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.
	10.06 Use a computer to assist in the completion of an agricultural project.
11.0	Demonstrate good work habits, and career planning in agriculture production. The student will be able to:
	11.01 Identify attitudes and habits necessary to achieve career success.
	11.02 Describe personality aspects to consider when choosing a career.
	11.03 Identify the basic steps in career planning.
	11.04 Identify and research career opportunities in agriculture and its related fields through a Foundational SAE.
12.0	Integrate the use of science, mathematics, reading, geography, history, writing, and communication in production agriculture. The student will be able to:
	12.01 Apply basic mathematics operations to solve agricultural problems.
	12.02 Correctly use measuring devices and utilize measurements to solve agricultural problems.

CTE Standards and Benchmarks	
	12.03 Prepare written and/or oral materials using correct English grammar.
	12.04 Identify the main idea in oral presentations and/or written materials.
	12.05 Locates, organizes, and interprets information from a variety of agricultural sources.
	12.06 Describe the historical evolution of agriculture.
	12.07 Select and study a problem that can be tested under controlled conditions to establish a hypothesis or to illustrate a known law.
13.0	Identify components of network systems. The student will be able to:
	13.01 Identify structure to access internet, including hardware and software components.
	13.02 Identify and configure user customization features in web browsers, including preferences, caching, and cookies.
	13.03 Recognize essential database concepts.
	13.04 Define and use additional networking and internet services.
14.0	Describe and use communication features of information technology. The student will be able to:
	14.01 Define important internet communications protocols and their roles in delivering basic Internet services.
	14.02 Identify basic principles of the Domain Name System (DNS).
	14.03 Identify security issues related to Internet clients.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Fundamentals of Agriculture, Food, and Natural Resource Services**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food, and Natural Resources**

Secondary – Middle School	
Course Number	8021400
CIP Number	148021400M
Grade Level	6-8
Course Length	year
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures.

Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one year. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8021400	Fundamentals of Agriculture, Food, and Natural Resource Services	Agriculture 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	year

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Identify components of agribusiness.
02.0 Recommend appropriate agriculture communications concepts.
03.0 Summarize skills used in landscape services.
04.0 Incorporate knowledge and skills involved with food science.
05.0 Construct a floral design.
06.0 Communicate skills gained from small, companion animal care.
07.0 Recommend leadership and communication styles.
08.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.
09.0 Recognize the value of responsibility, good work habits, and planning for career opportunities in agriculture services.
10.0 Identify components of network systems.
11.0 Describe and use communication features of information technology.

Florida Department of Education
Student Performance Standards

Course Title: **Fundamentals of Agriculture, Food and Natural Resource Services**
Course Number: **8021400**
Course Length: **1 Year**

Course Description:

This course is designed to develop competencies in the area of agriculture services. This includes: the global impact of agribusiness, communications, landscaping, food science, floral design, companion animal care, as well leadership skills. Laboratory-based activities are an integral part of this course. These include safe use and application of appropriate technology, scientific testing and observation equipment.

CTE Standards and Benchmarks	
01.0	Identify components of agribusiness. The student will be able to:
01.01	Describe the business cycle.
01.02	Complete a profit/loss statement.
01.03	Distinguish between types of competition practices.
01.04	Demonstrate proper methods of recording merchandise.
01.05	Summarize proper use of customer service skills.
01.06	Explain proper management techniques.
02.0	Recommend appropriate agriculture communications concepts. The student will be able to:
02.01	Sort and classify types of communication used in Agriculture.
02.02	Create messages using various forms of communication.
02.03	Generate a speech.
02.04	Compare and contrast different types of media.
02.05	Create a photo story.
02.06	Demonstrate proper ethics in communication.

CTE Standards and Benchmarks	
	02.07 Identify and compare regulating agencies.
	02.08 Evaluate careers in agriculture communications.
03.0	Summarize skills used in landscape services. The student will be able to:
	03.01 Distinguish plants based on common and scientific name.
	03.02 Conduct a soil test.
	03.03 Construct an irrigation system.
	03.04 Compare and contrast landscape styles.
	03.05 Select plants based on environmental factors.
	03.06 Design a landscape.
	03.07 Model personal safety and knowledge of equipment.
	03.08 Explain proper procedures for applying pesticides and fertilizer based on Best Management practices.
	03.09 Inventory an ecosystem.
	03.10 Apply knowledge of invasive plants.
	03.11 Apply knowledge of customer interactions
04.0	Incorporate knowledge and skills involved with food science. The student will be able to:
	04.01 Explain the process from farm to consumer
	04.02 Investigate safe food handling practices, and their regulating agencies
	04.03 Document changes in food preservation and how it impacted our civilization
	04.04 Recognize food processing and packaging procedures.
	04.05 Explain how to develop and market a food product.
	04.06 Describe the components of a nutrition label
	04.07 Create and market a food product.

CTE Standards and Benchmarks	
05.0	Construct a floral design. The student will be able to:
05.01	Compare and contrast historical and cultural contributions to design.
05.02	Identify types of arrangements and products.
05.03	Demonstrate knowledge of floral pricing.
05.04	Verify flowers by common and scientific name.
05.05	Assemble a floral arrangement.
05.06	Summarize knowledge of inventory skills.
05.07	Develop a marketing plan.
06.0	Communicate skills gained from small, companion animal care. The student will be able to:
06.01	Demonstrate knowledge of proper nutrition and health in small and companion animals.
06.02	Differentiate between animal welfare and animal rights.
06.03	Describe the training process for service animals
06.04	Compare and contrast career opportunities available for companion animals based on animal type and breed.
06.05	Explain proper care for a small animal.
07.0	Recommend leadership and communication styles. The student will be able to:
07.01	Explore the establishment and history of the FFA organization.
07.02	Analyze the characteristics and responsibilities of organizational leaders.
07.03	Demonstrate parliamentary procedure skills during a meeting.
07.04	Evaluate a committee which has an assigned task and report to the class.
07.05	Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.
07.06	Use a computer to assist in the completion of an agricultural project.
08.0	Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology. The student will be able to:

CTE Standards and Benchmarks	
	08.01 Apply basic mathematics operations to solve agricultural problems.
	08.02 Correctly use measuring devices and utilize measurements to solve agricultural problems.
	08.03 Apply the scientific method to solve an agricultural problem.
	08.04 Prepare written and/or oral materials using correct English grammar.
	08.05 Identify the main idea in oral presentations and/or written materials.
	08.06 Locates, organizes, and interprets information from a variety of agricultural sources.
	08.07 Describe the historical evolution of agriculture.
09.0	Recognize the value of responsibility, good work habits, and planning for career opportunities in agriculture services. The student will be able to:
	09.01 Identify attitudes and habits necessary to achieve career success.
	09.02 Describe personality aspects to consider when choosing a career.
	09.03 Identify the basic steps in career planning.
	09.04 Develop basic career plan.
	09.05 Identify and research career opportunities in agriculture and its related fields through a Foundational SAE.
10.0	Identify components of network systems. The student will be able to:
	10.01 Identify structure to access internet, including hardware and software components.
	10.02 Identify and configure user customization features in web browsers, including preferences, caching, and cookies.
	10.03 Recognize essential database concepts.
	10.04 Define and use additional networking and internet services.
11.0	Describe and use communication features of information technology. The student will be able to:
	11.01 Define important internet communications protocols and their roles in delivering basic Internet services.
	11.02 Identify basic principles of the Domain Name System (DNS).
	11.03 Identify security issues related to Internet clients.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Agriculture, Food and Natural Resource Directed Study**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Course Number	8100100
CIP Number	0101999901
Grade Level	11-12, 30-31
Course Length	1 credit - Multiple credits
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this course is to provide students with learning opportunities in a prescribed program of study within the Agriculture, Food and Natural Resources cluster that will enhance opportunities for employment in the career field chosen by the student.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The content is prescribed by the instructor based upon the individual student's assessed needs for directed study.

This course may be taken only by a student who has completed or is currently completing a specific secondary job preparatory program for additional study in this career cluster. A student may earn multiple credits in this course.

The selected standards and benchmarks, which the student must master to earn credit, must be outlined in an instructional plan developed by the instructor.

To teach the course listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary course structure:

Course Number	Course Title	Teacher Certification	Length	Level	Graduation Requirement
8100100	Agriculture, Food and Natural Resource Directed Study	AGRICULTUR 1 @2 ¶ANY AG EDUC G	1 credit – Multiple credits	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate expertise in a specific occupation contained within the career cluster.
02.0 Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results.
03.0 Apply enhanced leadership and professional career skills.
04.0 Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study.

Florida Department of Education
Student Performance Standards

Course Title: **Agriculture, Food and Natural Resource Directed Study**
Course Number: **8100100**
Course Credit: **1**

CTE Standards and Benchmarks	
01.0	Demonstrate expertise in a specific occupation within the career cluster. The student will be able to:
01.01	The benchmarks will be selected from the appropriate curriculum frameworks and determined by the instructor based upon the individual students assessed needs.
02.0	Conduct investigative research on a selected topic related to the career cluster using approved research methodology, interpret findings, and prepare presentation to defend results. The student will be able to:
02.01	Select investigative study referencing prior research and knowledge.
02.02	Collect, organize and analyze data accurately and precisely.
02.03	Design procedures to test the research.
02.04	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
03.0	Apply enhanced leadership and professional career skills. The student will be able to:
03.01	Develop and present a professional presentation offering potential solutions to a current issue.
03.02	Enhance leadership and career skills through work-based learning including job placement, job shadowing, entrepreneurship, internship, or a virtual experience.
03.03	Participate in leadership development opportunities available through the appropriate student organization and/or other professional organizations.
03.04	Enhance written and oral communications through the development of presentations, public speaking, and live and/or virtual interviews.
04.0	Demonstrate higher order critical thinking and reasoning skills appropriate for the selected program of study. The student will be able to:
04.01	Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.
04.02	Read and interpret information relative to the chosen occupation.
04.03	Locate and evaluate key elements of oral and written information.
04.04	Analyze and apply data and/or measurements to solve problems and interpret documents.

04.05 Construct charts/tables/graphs using functions and data.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Course Title: **Orientation to Agriscience and Career Planning**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Middle School	
Course Number	8100110
CIP Number	01019910CE
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This course provides an overview of agriculture and will help students to be educated about their food supply. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Students will learn a basic understanding of agriculture with focuses on plants, animals, and natural resources. Students will also learn about our food system and the safety procedures in agriculture systems.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8100110	Orientation to Agriscience and Career Planning	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate knowledge and skills in agriscience research.
02.0 Demonstrate knowledge and skills in the importance of agriculture.
03.0 Demonstrate knowledge and skills in agriscience laboratories and workshops.
04.0 Demonstrate knowledge and skills plant sciences.
05.0 Demonstrate knowledge and skills in animal sciences.
06.0 Demonstrate knowledge and skills in food science.
07.0 Demonstrate product knowledge and skills in agricultural processing and marketing.
08.0 Demonstrate knowledge and skills in natural resources.
09.0 Demonstrate leadership and communication skills.
10.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes:

11.0 Describe the influences that societal, economic, and technological changes have on employment trends and future training.
12.0 Develop skills to locate, evaluate, and interpret career information.
13.0 Identify and demonstrate processes for making short and long term goals.
14.0 Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
15.0 Understand the relationship between educational achievement and career choices/postsecondary options.
16.0 Identify a career cluster and related pathways through an interest assessment that match career and education goals.
17.0 Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
18.0 Demonstrate knowledge of technology and its application in career fields/clusters.

Florida Department of Education
Student Performance Standards

Course Title: **Orientation to Agriscience and Career Planning**
Course Number: **8100110**
Course Length: **Semester**

Course Description:

This course is designed to provide an understanding of the agricultural food system, environmental resources, and strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method. Throughout the semester/year students will take a closer look at agriculture and learn about the research and development of our food supply.

CTE Standards and Benchmarks	
01.0	Demonstrate knowledge and skills in agriscience research. The student will be able to:
01.01	Define agriscience.
01.02	Describe products of agriscience.
01.03	Define the scope of research in agriscience.
01.04	Discuss the impact of research on agriculture on consumer opinion.
01.05	Identify the steps of the scientific method.
01.06	Apply the scientific method to solve an agricultural problem.
02.0	Demonstrate knowledge and skills in the importance of agriculture. The student will be able to:
02.01	Describe the historical evolution of agriculture and its impact on civilization.
02.02	Discuss the scope of agriculture and its impact on daily life.
02.03	Identify specific areas of commodity production in the state, nation and world.
02.04	Describe the diversity of career opportunities in agriculture and its related fields through a Foundational SAE.
03.0	Demonstrate knowledge and skills in agriscience laboratories and workshops. The student will be able to:
03.01	Identify tools, machines and equipment used in agriculture.

	03.02 Demonstrates proper laboratory/ workshop safety techniques.
	03.03 Complete a project demonstrating the safe use of agricultural tools, machinery or equipment.
	03.04 Discuss the impact of agricultural mechanization and engineering on society.
	03.05 Conduct an experiment using proper laboratory techniques.
04.0	Demonstrate knowledge and skills in plant sciences. The student will be able to:
	04.01 Distinguish between horticulture, forestry, and agronomic.
	04.02 Propagate and grow an agricultural plant.
	04.03 Identify supplies and services industries related to plant science.
	04.04 Develop a specimen collection of local plant materials.
	04.05 Demonstrate proper planting techniques.
	04.06 Discuss organic agriculture and conventional agriculture as it relates to plants
05.0	Demonstrate knowledge and skills in animal sciences. The student will be able to:
	05.01 Distinguish between food, service and companion animals.
	05.02 Identify breeds of food, service and companion animals.
	05.03 Identify supplies and services industries related to animal science.
	05.04 Identify the needs of an animal and describe and describe proper care for that animal.
	05.05 Identify consumer foods and products derived from animals.
	05.06 Discuss organic and conventional agriculture as it relates to livestock production.
06.0	Demonstrate knowledge and skills in food science. The student will be able to:
	06.01 Describe the proper handling techniques and storage of food products from farm to plate.
	06.02 List and explain methods of food preservation.
	06.03 Conduct a food taste test.
	06.04 Develop a production and marketing plan for a food product.

	06.05 Read and interpret a food label.
07.0	Demonstrate product knowledge and skills in agricultural processing and marketing. The student will be able to:
	07.01 Define agricultural product processing and marketing.
	07.02 Describe the processing and marketing of an agriculture product from farm to consumer.
	07.03 Prepare, process, and market an agricultural product.
08.0	Demonstrate knowledge and skills in natural resources. The student will be able to:
	08.01 Define and identify renewable and nonrenewable natural resources.
	08.02 Describe agricultural management practices that conserve natural resources.
	08.03 Describe effects of pollution on the environment.
	08.04 Demonstrate how to recycle or conserve a natural resource.
09.0	Demonstrate leadership and communication skills. The student will be able to:
	09.01 Describe the aims and purposes of the FFA organization.
	09.02 Identify opportunities available to FFA members.
	09.03 Identify characteristics of a good leader.
	09.04 Participate in a cooperative leadership development activity or FFA Career Development Event.
	09.05 Identify the importance of effective communication skills.
	09.06 Demonstrate effective communication skills.
	09.07 Describe the diversity of career opportunities in agriculture and its related fields through a Foundational SAE.
10.0	Integrate the use of science, mathematics, reading, geography, history, writing and communication in agriscience and technology. The student will be able to:
	10.01 Apply basic mathematic operations to solve agricultural problems.
	10.02 Correctly use measuring instruments and utilize measurements to solve agricultural problems.
	10.03 Prepare written and oral materials using correct English grammar.
	10.04 Identify the main idea in oral presentations and written materials.

	10.05 Locates, organizes and interprets information from a variety of agricultural sources.
Listed below are the standards that must be met to satisfy the requirements of Section 1003.4156, Florida Statutes: The student will be able to**:**	
11.0	Describe the influences that societal, economic, and technological changes have on employment trends and future training.
12.0	Develop skills to locate, evaluate, and interpret career information.
13.0	Identify and demonstrate processes for making short and long term goals.
14.0	Demonstrate employability skills such as working in a group, problem-solving and organizational skills, and the importance of entrepreneurship.
15.0	Understand the relationship between educational achievement and career choices/postsecondary options.
16.0	Identify a career cluster and related pathways through an interest assessment that match career and education goals.
17.0	Develop a career and education plan that includes short and long-term goals, high school program of study, and postsecondary/career goals.
18.0	Demonstrate knowledge of technology and its application in career fields/clusters.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career Planning

Effective July 1, 2019, per Section 1003.4156, Florida Statutes (F.S.), for students to meet middle grades promotion requirements, a Career and Education Planning course must be completed in either sixth, seventh, or eighth grade. These courses should be taught integrating the eight career and education planning course standards.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Introduction to Agriscience**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Middle School	
Course Number	8100120
CIP Number	01019921EX
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This course is the first in a sequence of courses designed to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Students will learn a basic understanding of agriculture with focuses on plants, animals, and natural resources. Students will also learn about our food system and the safety procedures in agriculture systems.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8100120	Introduction to Agriscience	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Identify the importance of agriscience.
02.0 Identify and practice agriculture safety skills.
03.0 Describe the importance of plants and animals in agriculture.
04.0 Use selected techniques to produce finished products from agricultural materials.
05.0 Describe leadership and communication skills.
06.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Agriscience**
Course Number: **8100120**
Course Length: **Semester**

Course Description:

This course is the first course in a sequence of middle school agriculture study. This course is designed to develop competencies in the areas of agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Content of this course is focused on the introduction to the food system. During the semester/ year students will learn about plants, animals, food systems, and natural resources.

CTE Standards and Benchmarks	
01.0	Identify the importance of agriscience. The student will be able to:
01.01	Define agriscience and explain its diversity and scope.
01.02	Describe the importance of agriculture on a world, national, state, and community scale.
01.03	Describe the importance of agriculture in each individual's life.
01.04	Collect and discuss information on current agricultural events.
01.05	Trace the evolution of agriscience from its beginnings to current applications.
01.06	Identify the major agricultural production areas and the major commodities produced in the United States and Florida.
01.07	Describe the diversity of career opportunities in agriculture and its related fields through a Foundational SAE.
01.08	Describe the relationship between natural resources and agriculture.
01.09	Describe technology used in agricultural production, processing, and marketing of agricultural products.
02.0	Identify and practice agriculture safety skills. The student will be able to:
02.01	Identify procedures for safely using equipment.
02.02	Identify and use proper personal protective equipment (PPE).
02.03	Describe proper procedures for safety in agriculture classroom, laboratory, and land-laboratory.

03.0	Describe the importance of plants and animals in agriculture. The student will be able to:
	03.01 Identify plants important to agriculture.
	03.02 Identify animals important to agriculture.
	03.03 Demonstrate the proper handling and ethical care of animals.
	03.04 Describe animal rights and animal welfare.
	03.05 Compare organic farming and conventional farming.
	03.06 Identify conditions necessary for agricultural production.
	03.07 Evaluate proper health and nutrition for livestock animals.
	03.08 Compare companion animals and livestock animals
	03.09 Identify the agricultural source of consumer products.
	03.10 Trace the development of an agricultural product from the producer to the consumer.
04.0	Use selected techniques to produce finished products from agricultural materials. The student will be able to:
	04.01 Complete a project safely using the appropriate agricultural tools, machinery, or equipment.
	04.02 Prepare and process an agricultural product.
	04.03 Propagate horticulture plants.
05.0	Describe leadership and communication skills. The student will be able to:
	05.01 Describe the aims and purposes of the FFA organization.
	05.02 Identify opportunities available to FFA members.
	05.03 Define leadership and different leadership styles.
	05.04 Define communication and identify methods of communication
	05.05 Prepare and present and extemporaneous speech.
06.0	Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology. The student will be able to:
	06.01 Apply basic mathematics operations to solve agricultural problems.

06.02	Correctly use measuring devices and utilize measurements to solve agricultural problems.
06.03	Prepare written and oral materials using correct English grammar.
06.04	Identify the main idea in oral presentations and written materials.
06.05	Locates, organizes, and interprets information from a variety of agricultural sources.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Exploration of Agriscience**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Middle School	
Course Number	8100210
CIP Number	01019920EX
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to assist students in making informed decisions regarding their future academic and occupational goals and to provide information regarding careers in the Agriculture, Food and Natural Resource career cluster. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8100210	Exploration of Agriscience	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MG General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Explain the evolution of agriculture.
02.0 Apply knowledge and skills in plant sciences.
03.0 Apply knowledge and skills in Forestry.
04.0 Apply knowledge and skills in animal sciences.
05.0 Demonstrate knowledge and skills in food science.
06.0 Apply knowledge and skills in biotechnology.
07.0 Apply knowledge and skills in processing and marketing.
08.0 Apply knowledge and skills in natural resources.
09.0 Apply leadership and communication skills.
10.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

Florida Department of Education
Student Performance Standards

Course Title: **Exploration of Agriscience**
Course Number: **8100210**
Course Length: **Semester**

Course Description:

This course is designed for students that have already covered the basic introduction to agriculture. This course is designed to provide instruction that explores the tasks, training, education and physical requirements of a broad range of agriscience and natural resources careers develop competencies in the areas of agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. During the semester/ year students will take a more in depth look into plants, animals, natural resources, and food science as they learn more about our food system.

CTE Standards and Benchmarks	
01.0	Explain the evolution of agriculture. The student will be able to:
01.01	Define agriculture.
01.02	Identify and research opportunities in agriculture and its related fields through a Foundational SAE.
01.03	Explain how commodities have diversified in Florida.
02.0	Apply knowledge and skills in plant sciences. The student will be able to:
02.01	Produce an agricultural plant.
02.02	Discuss the technology involved in the development of improved crops.
02.03	Identify agribusinesses that provide supplies and services to plant science industries in the state.
02.04	Identify the recommended uses and safety precautions from a pesticide label.
02.05	Discuss basic landscape design.
02.06	Identify pests, pathogens, parasites, and predators of horticultural and agronomic crops.
02.07	Describe the major components of soil.
02.08	Demonstrate how to read a fertilizer label

	02.09 Describe various forms of fertilizer and proper application method.
03.0	Apply knowledge and skills in Forestry. The student will be able to:
	03.01 Identify the major forest regions of the United States and Florida.
	03.02 Describe the importance of forests and forest products.
	03.03 Describe how trees grow, reproduce, and components of forest health.
	03.04 Describe tools and techniques common to the forest industry.
	03.05 Identify pests, pathogens, parasites, and predators of forests.
04.0	Apply knowledge and skills in animal sciences. The student will be able to:
	04.01 Describe the differences between animal welfare and animal rights.
	04.02 Discuss the technology involved in the development of improved animal products.
	04.03 Identify important breeds of livestock.
	04.04 Identify agribusinesses that provide supplies and services to animal science industries in the state.
	04.05 Describe the uses of livestock and their products.
05.0	Demonstrate knowledge and skills in food science. The student will be able to:
	05.01 Demonstrate the proper handling and storage of food products from farm to plate.
	05.02 Describe and demonstrate at least one method of food preservation.
	05.03 Conduct a food taste test.
	05.04 Produce and market a food product.
	05.05 Read, interpret, and develop a food label.
	05.06 Describe the components of a balance diet.
	05.07 Identify and compare USDA standards and grades for agricultural products.
06.0	Apply knowledge and skills in biotechnology. The student will be able to:
	06.01 Define biotechnology.

	06.02 Discuss current and future uses of genetic engineering.
	06.03 Identify issues associated with biotechnology.
	06.04 Explain the history of genetic engineering and biotechnology in agriculture.
07.0	Apply knowledge and skills in agricultural processing and marketing. The student will be able to:
	07.01 Identify processing and packaging techniques used in agriculture.
	07.02 Discuss the difference in marketing strategies between perishable and nonperishable commodities.
	07.03 Describe how processing, packaging, and marketing affects the price of an item.
	07.04 Recognize misleading advertising.
	07.05 Describe how competition benefits the consumer.
08.0	Apply knowledge and skills in natural resources. The student will be able to:
	08.01 Identify methods or practices of the conservation natural resources.
	08.02 Demonstrate a method or practice of conservation.
	08.03 Identify major ecosystems in Florida.
	08.04 Discuss the importance of the ecosystems to agriculture, society and each other.
	08.05 Define Best Management Practices (BMPs) and explain their benefits to agriculture.
09.0	Apply leadership and communication skills. The student will be able to:
	09.01 Discuss the establishment and history of the FFA organization.
	09.02 Identify the characteristics and responsibilities of organizational leaders.
	09.03 Identify parliamentary procedure skills during a business meeting.
	09.04 Demonstrate effective communication skills through delivery of a speech or conducting a demonstration.
	09.05 Identify communication skills necessary for effective leadership.
	09.06 Identify state and community organizations associated with agricultural promotion.
10.0	Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology. The student will be able to:

10.01	Apply basic mathematics operations to solve agricultural problems.
10.02	Correctly use measuring devices and utilize measurements to solve agricultural problems.
10.03	Apply the scientific method to solve an agricultural problem.
10.04	Prepare written and/or oral materials using correct English grammar.
10.05	Identify the main idea in oral presentations and/or written materials.
10.06	Locate, organize, and interpret information from a variety of agricultural sources.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Orientation to Agriscience**
Course Type: **Orientation/Exploratory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Middle School	
Course Number	8100310
CIP Number	01019910OR
Grade Level	6-8
Course Length	Semester
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This course provides an overview of agriculture and will help students to be educated about their food supply. The content includes but is not limited to agricultural literacy, importance of agriculture, the role of science, math, reading, writing, geography, history, and technology in agriculture, plants and animals, and sources of consumer goods from agriculture. Reinforcement of academic skills occurs through classroom instruction and applied laboratory procedures. Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the equipment, materials and technology appropriate to the course content and in accordance with current practices.

Students will learn a basic understanding of agriculture with focuses on plants, animals, and natural resources. Students will also learn about our food system and the safety procedures in agriculture systems.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

The length of this course is one semester. It may be offered for two semesters when appropriate. When offered for one semester, it is recommended that it be at the exploratory level and more in-depth when offered for two semesters. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the course structure:

Course Number	Course Title	Teacher Certification	Length
8100310	Orientation to Agriscience	AGRICULTUR 1 @2 AGRICUTUR 7G EXP AG @4 MS General Science 025	Semester

Standards

After successfully completing this course, the student will be able to perform the following:

01.0 Demonstrate knowledge and skills in agriscience research.
02.0 Demonstrate knowledge and skills in the importance of agriculture.
03.0 Demonstrate knowledge and skills in agriscience laboratories and workshops.
04.0 Demonstrate knowledge and skills in plant sciences.
05.0 Demonstrate knowledge and skills in animal sciences.
06.0 Demonstrate knowledge and skills in food science.
07.0 Demonstrate product knowledge and skills in agricultural processing and marketing.
08.0 Demonstrate knowledge and skills in natural resources.
09.0 Demonstrate leadership and communication skills.
10.0 Integrate the use of science, mathematics, reading, geography, history, writing, and communication in agriscience and technology.

Florida Department of Education
Student Performance Standards

Course Title: **Orientation to Agriscience**
Course Number: **8100310**
Course Length: **Semester**

Course Description:

This course is designed to provide an understanding of the agricultural food system, environmental resources, and strategies used to produce and market agricultural products, and an exploration of research through the use of the scientific method. Throughout the semester/year students will take a closer look at agriculture and learn about the research and development of our food supply.

CTE Standards and Benchmarks	
01.0	Demonstrate knowledge and skills in agriscience research. The student will be able to:
01.01	Define agriscience.
01.02	Describe products of agriscience.
01.03	Define the scope of research in agriscience.
01.04	Discuss the impact of research on agriculture on consumer opinion.
01.05	Identify the steps of the scientific method.
01.06	Apply the scientific method to solve an agricultural problem.
02.0	Demonstrate knowledge and skills in the importance of agriculture. The student will be able to:
02.01	Describe the historical evolution of agriculture and its impact on civilization.
02.02	Discuss the scope of agriculture and its impact on daily life.
02.03	Identify specific areas of commodity production in the state, nation and world.
02.04	Describe the diversity of career opportunities in agriculture and its related fields through a Foundational SAE.
03.0	Demonstrate knowledge and skills in agriscience laboratories and workshops. The student will be able to:
03.01	Identify tools, machines and equipment used in agriculture.

	03.02 Demonstrates proper laboratory/ workshop safety techniques.
	03.03 Complete a project demonstrating the safe use of agricultural tools, machinery or equipment.
	03.04 Discuss the impact of agricultural mechanization and engineering on society.
	03.05 Conduct an experiment using proper laboratory techniques.
04.0	Demonstrate knowledge and skills in plant sciences. The student will be able to:
	04.01 Distinguish between horticulture, forestry, and agronomy.
	04.02 Propagate and grow an agricultural plant.
	04.03 Identify supplies and services industries related to plant science.
	04.04 Develop a specimen collection of local plant materials.
	04.05 Demonstrate proper planting techniques.
	04.06 Discuss organic agriculture and conventional agriculture as it relates to plants.
05.0	Demonstrate knowledge and skills in animal sciences. The student will be able to:
	05.01 Distinguish between food, service and companion animals.
	05.02 Identify breeds of food, service and companion animals.
	05.03 Identify supplies and services industries related to animal science.
	05.04 Identify the needs of an animal and describe and describe proper care for that animal.
	05.05 Identify consumer foods and products derived from animals.
	05.06 Discuss organic and conventional agriculture as it relates to livestock production.
06.0	Demonstrate knowledge and skills in food science. The student will be able to:
	06.01 Describe the proper handling techniques and storage of food products from farm to plate.
	06.02 List and explain methods of food preservation.
	06.03 Conduct a food taste test.
	06.04 Develop a production and marketing plan for a food product.

	06.05 Read and interpret a food label.
07.0	Demonstrate product knowledge and skills in agricultural processing and marketing. The student will be able to:
	07.01 Define agricultural product processing and marketing.
	07.02 Describe the processing and marketing of an agriculture product from farm to consumer.
	07.03 Prepare, process, and market an agricultural product.
08.0	Demonstrate knowledge and skills in natural resources. The student will be able to:
	08.01 Define and identify renewable and nonrenewable natural resources.
	08.02 Describe agricultural management practices that conserve natural resources.
	08.03 Describe effects of pollution on the environment.
	08.04 Demonstrate how to recycle or conserve a natural resource.
09.0	Demonstrate leadership and communication skills. The student will be able to:
	09.01 Describe the aims and purposes of the FFA organization.
	09.02 Identify opportunities available to FFA members.
	09.03 Identify characteristics of a good leader.
	09.04 Participate in a cooperative leadership development activity or FFA Career Development Event.
	09.05 Identify the importance of effective communication skills.
	09.06 Demonstrate effective communication skills.
10.0	Integrate the use of science, mathematics, reading, geography, history, writing and communication in agriscience and technology. The student will be able to:
	10.01 Apply basic mathematic operations to solve agricultural problems.
	10.02 Correctly use measuring instruments and utilize measurements to solve agricultural problems.
	10.03 Prepare written and oral materials using correct English grammar.
	10.04 Identify the main idea in oral presentations and written materials.
	10.05 Locate, organize, and interpret information from a variety of agricultural sources.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

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Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Course Title: **Advanced Concepts of Agriscience**
Course Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Course Number	8100330
CIP Number	0101999902
Grade Level	11-12, 30-31
Course Length	1 credit
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The purpose of this course is to provide students who have completed or are currently completing a specific secondary job preparatory program, a capstone experience in agriscience education. This course is designed to enhance competencies in the areas of agricultural science and research; biological and physical science; environmental principles; and principles of leadership. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

This program is a planned sequence of instruction consisting of one course.

To teach the course listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary course structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8100330	Advanced Concepts of Agriscience	AGRICULTUR 1 @2	1 credit		2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Conduct a research project in agriculture using the scientific method, interpret research information, and prepare and present a research project.
02.0 Apply enhanced leadership and professional career skills.
03.0 Illustrate agricultural applications of physical science concepts and principles.

Optional Standards

04.0 Investigate the concepts, principles, and theories associated with the classification, growth, function, and reproduction of plants and soils.
05.0 Investigate concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, ecology, and related current issues to understand animal life and animal science as it pertains to agriculture.
06.0 Investigate how chemistry and physics principles are applied to the composition of foods, food nutrition, and microbiology as it is associated with the food science segment of agriculture.
07.0 Apply enhanced agricultural communication and/or agricultural sales skills.

Florida Department of Education
Student Performance Standards

Course Title: **Advanced Concepts of Agriscience**
Course Number: **8100330**
Course Credit: **1**

CTE Standards and Benchmarks	
01.0	Conduct a research project in agriculture using the scientific method, interpret research information, and prepare and present a research project. The student will be able to:
01.01	Formulate hypotheses referencing prior research and knowledge.
01.02	Conduct controlled experiments or simulations to test hypotheses.
01.03	Collect, organize and analyze data accurately and precisely.
01.04	Design procedures to test the selected hypotheses.
01.05	Report, display and defend the results of investigations to audiences that may include professionals and technical experts.
01.06	Estimate and suggest ways to reduce the degree of risk involved in activities in agriculture and related sciences.
02.0	Apply enhanced leadership and professional career skills. The student will be able to:
02.01	Identify and investigate a current agricultural issue.
02.02	Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.
02.03	Identify the opportunities for enhanced leadership development available through the National FFA Organization and/or professional organizations.
02.04	Enhance written and oral communications through developing resumes and interviews.
03.0	Illustrate agricultural applications of physical science concepts and principles. The student will be able to:
03.01	Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.
03.02	Evaluate Sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations.
03.03	Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.
03.04	Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).

CTE Standards and Benchmarks	
03.05	Analyze reactions (e.g., burning of fuel, decomposition of waste) in natural and man-made energy systems.
03.06	Describe the need for organization, supervision, rules, policies and procedures.
Optional Standards: Each program offering this course will provide instruction in one or more of the following standards. Selection of standard(s) will be based on the agriscience education program the student has completed or is completing.	
04.0	Investigate the concepts, principles, and theories associated with the classification, growth, function, and reproduction of plants and soils. The student will be able to:
04.01	Describe biotechnology and genetic engineering.
04.02	Discuss the benefits and risks of biotechnology and genetic engineering.
04.03	Describe the functions of water in plant growth.
04.04	Identify major sources of water pollution and possible measures for its control.
04.05	Contrast the biochemistry and functions of plant cell membranes and cell walls.
04.06	Describe and give functions for common plant cell types.
04.07	Identify cell types and functions associated with the vascular, dermal, and ground tissue systems in woody and herbaceous plant parts.
04.08	Compare and contrast periderm and epidermis and xylem and phloem.
04.09	Explain how differential gene expression is what determines which proteins are made, and how the proteins decide the characteristics and functions of a particular cell.
04.10	Describe methods of producing transgenic plants and ways in which they are used.
05.0	Investigate concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, ecology, and related current issues to understand animal life and animal science as it pertains to agriculture. The student will be able to:
05.01	Identify the major features of chordates, identify the highlights of vertebrate evolution (development of jaws, cartilage to bone, and water to land), and identify the distinguishing characters of fish, birds, and mammals.
05.02	Describe the biochemistry and functions of animal cell membranes. In doing so, describe the fluid mosaic model of the membrane and the role of the cell membrane proteins in transporting materials in and out of cells.
05.03	Using examples relevant to animal science, track the events involved in expression of individual genes and compartmentalization of the resulting proteins.
05.04	Discuss four basic tissue types: epithelial, connective, muscle, and nervous.
05.05	Describe the chemical process in the formation of bones and muscles and the process of calcification and its impact on animal growth.

CTE Standards and Benchmarks	
	05.06 Describe homeostasis and how it is controlled.
	05.07 Explain the flow of genetic information and identify the central dogma: DNA transcription-mRNA-translation-protein.
	05.08 Describe the purpose, function, and production of RNA, and explain how protein synthesis works.
06.0	Investigate how chemistry and physics principles are applied to the composition of foods, food nutrition, and microbiology as it is associated with the food science segment of agriculture. The student will be able to:
	06.01 Describe composition and arrangement of functional groups found in biological systems.
	06.02 Discuss the chemical composition and structure of protein molecules including primary, secondary, tertiary, and quaternary structures.
	06.03 Discuss the biochemical and physiological functions of proteins, carbohydrates, lipids, vitamins, and minerals.
	06.04 Explain thermodynamics and kinetics (e.g., reaction rates for affecting quality and destroying nutrients).
	06.05 Compare and contrast the chemical reactions initiated by the effect of heat, oxygen, acid, and light during processing and storage of foods.
	06.06 Identify the various food spoilage methods including microbial spoilage, chemical spoilage, and their effect on food product shelf-life.
	06.07 Compare and contrast three types of chemical bonds: hydrogen, ionic and covalent bonds.
07.0	Apply enhanced agricultural communication and/or agricultural sales skills. The student will be able to:
	07.01 Evaluate the effectiveness of a current communications or marketing campaign.
	07.02 Develop and implement a communications or marketing campaign for an agricultural product or issue.
	07.03 Apply enhanced written and oral communication skills by selecting the correct style, tone, and format appropriate for a variety of settings.
	07.04 Demonstrate characteristics of a responsible/ethical agricultural communicator.
	07.05 Select the proper communication medium and target audience for a current agricultural issue.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Course Title: **Agriculture, Food, and Natural Resources Cooperative Education OJT**
Course Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Cooperative Education - OJT	
Course Number	8100410
CIP Number	01019999CP
Grade Level	9-12, 30, 31
Course Length	Multiple credits
Teacher Certification	Refer to the **Course Structure** section.
CTSO	FFA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources cluster.

Each student job placement must be related to the job preparatory program in which the student is enrolled or has completed.

The purpose of this course is to provide the on-the-job training component when the **cooperative method of instruction** is appropriate. Whenever the cooperative method is offered, the following is required for each student: a training agreement; a training plan signed by the student, teacher and employer, including instructional objectives; a list of on-the-job and in-school learning experiences; a workstation which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal; and a site supervisor with a working knowledge of the selected occupation. The workstation may be in an industry setting or in a virtual learning environment. The student **must be compensated** for work performed.

The teacher/coordinator must meet with the site supervisor a minimum of once during each grading period for the purpose of evaluating the student's progress in attaining the competencies listed in the training plan.

Agriculture, Food, and Natural Resources Cooperative Education - OJT may be taken by a student for one or more semesters. A student may earn multiple credits in this course. The specific student performance standards which the student must achieve to earn credit are specified in the Cooperative Education - OJT Training Plan.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Course Structure

To teach the course listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary course structure:

Course Number	Course Title	Teacher Certification	Length	Level	Graduation Requirement
8100410	Agriculture, Food, and Natural Resources Cooperative Education OJT	AGRICULTUR 1 @2 ¶ANY AG ED G	Multiple Credits	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Perform designated job skills.
02.0 Demonstrate work ethics.

Florida Department of Education
Student Performance Standards

Course Title: Agriculture, Food, and Natural Resources Cooperative Education - OJT
Secondary Number: 8100410

Standards and Benchmarks	
01.0	Perform designated job skills. The student will be able to:
01.01	Perform tasks as outlined in the training plan.
01.02	Demonstrate job performance skills.
01.03	Demonstrate safety procedures on the job.
01.04	Maintain appropriate records.
01.05	Attain an acceptable level of productivity.
01.06	Demonstrate appropriate dress and grooming habits.
02.0	Demonstrate work ethics. The student will be able to:
02.01	Follow directions.
02.02	Demonstrate good human relations skills on the job.
02.03	Demonstrate good work habits.
02.04	Demonstrate acceptable business ethics.

Additional Information

Special Notes

The **Cooperative Education Manual** is available on-line and has guidelines for students, teachers, employers, parents and other administrators and sample training agreements. It can be accessed on the DOE Website at http://fldoe.org/academics/career-adult-edu/career-tech-edu/additional-cte-programs-courses/diversified-edu.stml

The occupational standards and benchmarks outlined in this secondary course correlate to the standards and benchmarks of the postsecondary course with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Animal Science and Services**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8106200
CIP Number	0101030210
Grade Level	9-12
Program Length	6 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	45-2093 -- Farmworkers, Farm, Ranch, and Aquacultural Animals 45-1011 -- First-Line Supervisors of Farming, Fishing, and Forestry Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, health, safety and environmental issues, and the use and care of animal health-care instruments, animal grooming equipment, animal restraining equipment, and laboratory equipment.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of six courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.
To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7 G	1 credit		3	EQ
8106210	Animal Science and Services 2		1 credit	45-2093	2	CT
8106220	Animal Science and Services 3		1 credit	45-2093	2	CT
8106230	Animal Science and Services 4		1 credit	45-1011	2	CT
8106240	Animal Science and Services 5		1 credit	45-1011	2	CT
8106250	Animal Science and Services 6		1 credit	45-1011	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Animal Science and Services 2

09.0 Describe animal science and the role of animals in society.
10.0 Classify animals according to hierarchical taxonomy and agricultural use.
11.0 Evaluate and implement the steps and requirements to pursue a career opportunity in the animal industry.
12.0 Describe animal and human first aid and laboratory safety.
13.0 Recognize normal and abnormal animal behaviors.
14.0 Apply principles of comparative anatomy and physiology to uses within various animal systems.
15.0 Demonstrate safe animal handling and management techniques.
16.0 Analyze the community's responsibility in options for caring for unwanted /neglected livestock.
17.0 Evaluate the importance of the animal science industry to understand the impact on global economy.

Animal Science and Services 3

18.0 Analyze feed rations, additives, and supplements and assess how they meet the nutritional needs of animals.
19.0 Evaluate animals for breeding readiness and soundness.
20.0 Explain the reproductive system and breeding of selected animals.
21.0 Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare.
22.0 Apply basic principles of veterinary science to animal production.
23.0 Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level.
24.0 Demonstrate knowledge of preventive medicine and disease control.
25.0 Select animals for specific purposes and maximum performance based on anatomy and physiology.
26.0 Prepare, groom, exhibit, and market animals.
27.0 Maintain and analyze records.
28.0 Explain the components of the American business system. (sole proprietorship, partnership, corporation, limited liability company, cooperative).

Animal Science and Services 4

29.0 Apply animal health practices.
30.0 Maintain equipment and facilities.
31.0 Operate, maintain, and repair machinery and equipment.
32.0 Investigate emerging technologies in Animal Science.
33.0 Apply scientific principles in the selection and breeding of animals.
34.0 Maintain and analyze records.
35.0 Manage pasture and forage crops.
36.0 Understand the relationship of animal production and the environment.
37.0 Evaluate the effects of environmental conditions on animals.
38.0 Identify and interpret environmental issues and regulations pertaining to animal industry.

Animal Science and Services 5

39.0 Discuss animal marketing techniques.
40.0 Apply advanced animal health practices.
41.0 Maintain and analyze records.
42.0 Perform emergency first aid on animals.
43.0 Implement procedures to ensure that animal products are safe.
44.0 Identify, select, and breed food-producing animals.
45.0 Analyze county, state and federal agencies that support the animal industry.

Animal Science and Services 6

46.0 Plan routine management of food-producing animals and facilities.
47.0 Maintain and analyze records.
48.0 Design animal housing, equipment, and handling facilities for animal production.
49.0 Comply with government regulations and safety standards for facilities used in animal production.
50.0 Identify and interpret rules, policy, and regulations affecting the livestock industry.
51.0 Evaluate the effects of environmental conditions on animals.
52.0 Identify and interpret environmental issues and regulations pertaining to animal industry.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Animal Science and Services 2**
Course Number: **8106210**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of safety; animal behavior; animal welfare; animal control; and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Describe animal science and the role of animals in society. The student will be able to:	
09.01	Describe animal science and the role of animals in society.	
09.02	Analyze perceptions of public opinion of animal related issues.	
09.03	Identify the origin, significance, distribution, and domestication of animal species.	AS.01.01.01.a
09.04	Describe animal adaptations developed in response to environment and domestication.	AS.01.01.01.b
09.05	Predict adaptations of animals to production practices and environments.	AS.01.01.01.c
09.06	Describe the predominant sectors of the animal science industry.	AS.01.01.02.a
09.07	Outline the development of the animal industry and the resulting products, services, and careers.	AS.01.01.02.b
09.08	Predict trends and implications of future development of the animal systems industry.	AS.01.01.02.c
10.0	Classify animals according to hierarchical taxonomy and agricultural use. The student will be able to:	AS.06.01
10.01	Analyze the visual characteristics of an animal or animal product; select taxonomical classification terminology when referring to companion and production animals.	AS.06.01.03.b
10.02	Appraise and evaluate the economic value of animals for various applications in the agriculture industry.	AS.06.01.02.b
11.0	Evaluate and implement the steps and requirements to pursue a career opportunity in the animal industry. The student will be able to:	CS.05.01
11.01	Locate and obtain information on animal-industry careers and career opportunities.	
11.02	Examine the educational training and experiential requirements to pursue a career in the animal industry.	CS.05.01.02.a

CTE Standards and Benchmarks		National Standards
	11.03 Examine professional organizations and commodity groups in the animal industry and supporting organizations.	
	11.04 Demonstrate those qualities, attributes, and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.	
	11.05 Prepare and maintain Supervised Agricultural Experience (SAE) records.	
12.0	Describe animal and human first aid and laboratory safety. The student will be able to:	
	12.01 Practice safe procedures when working with animal-related equipment and in laboratory settings.	
	12.02 Understand animal behaviors as they relate to practicing safety precautions around animal restraint.	
	12.03 Discuss the impact of unsafe procedures.	
	12.04 Define zoonosis and identify selected zoonotic diseases.	
	12.05 Discuss OHSA as it relates to the animal industry.	
	12.06 Explain how to use a first aid kit and its key components.	
	12.07 Recognize allergic reactions and proper responses.	
	12.08 Describe proper use of eye wash solution.	
	12.09 Explain how to control minor hemorrhage and/or trauma.	
	12.10 Explain emergency procedures.	
13.0	Recognize normal and abnormal animal behaviors. The student will be able to:	
	13.01 Distinguish between instinctive and learned behaviors.	
	13.02 Recognize normal and abnormal behavioral characteristics of animals through observations.	
	13.03 Identify behavioral problems.	
14.0	Apply principles of comparative anatomy and physiology to uses within various animal systems. The student will be able to:	AS.06.02
	14.01 Identify parts, major organ, and functions, of the following systems of animals using correct terminology: • Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton. • Identify the general function of the nervous system and the major organs.	AS.06.02.03.a

CTE Standards and Benchmarks		National Standards
	• Identify the general function of the muscular system and major groups of muscles. • Identify the general function of the digestive system; differentiate between ruminants and non-ruminants (monogastric and hind gut fermentors); and the major organs. • Identify the general function of the respiratory system and the major organs. • Identify the general function of the urinary system and the major organs. • Identify the general function of the reproductive system and both male and female organs.	
14.02	Compare and contrast animal cells, tissues, organs, body systems types and functions among animal species.	AS.06.02.03.b
14.03	Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions.	AS.06.02.03.c
14.04	Correlate the functions of animal cell structures to animal growth, development, health, and reproduction.	AS.06.02.01.c
15.0	Demonstrate safe animal handling and management techniques. The student will be able to:	AS.02.01
15.01	Devise, implement and evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses.	AS.02.01.02.c
15.02	Outline safety procedures for working with animals by species.	
15.03	Interpret animal behaviors and execute protocols for safe handling of animals.	
15.04	Analyze and document animal husbandry practices and their impact on animal welfare.	AS.02.01.03.b
15.05	Design programs that assure the proper care and use of animals and prevent abuse or mistreatment.	AS.02.01.01.b
15.06	Implement quality-assurance programs and procedures for animal production.	AS.02.01.01.c
16.0	Analyze the community's responsibility in options for caring for unwanted/neglected livestock. The student will be able to:	
16.01	Differentiate between animal control agencies and humane societies.	
16.02	Explain the laws governing animal care and use.	
17.0	Evaluate the importance of the animal science industry to understand the impact on global economy. The student will be able to:	
17.01	Assess the impact of the animal science industry upon the US gross national product and the total global economy.	
17.02	Investigate local, state, and national regulatory laws, industry regulations, and legislation for animal agriculture businesses.	
17.03	Identify and describe the primary government agencies involved with animal agriculture.	

CTE Standards and Benchmarks	National Standards
17.04 Research new and emerging technologies in animal agriculture and their impact on the economy.	
17.05 Recognize the value of the food and agribusiness industry.	

Florida Department of Education
Student Performance Standards

Course Title: **Animal Science and Services 3**
Course Number: **8106220**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of animal digestive systems; animal breeding; preventive medicine and disease control; control of parasites; animal marketing; and analyzing records.

CTE Standards and Benchmarks		National Standards
18.0	Analyze feed rations, additives, and supplements and assess how they meet the nutritional needs of animals. The student will be able to:	AS.03.02
18.01	Compare and contrast common types of feedstuffs and the roles they play in the diets of animals.	AS.03.02.01.a
18.02	Discuss the relative nutritional value of feedstuffs by evaluating their general quality and condition.	AS.03.02.01.b
18.03	Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs.	AS.03.02.01.c
18.04	Examine the importance of a balanced ration for animals based on the animal's growth stage (e.g., maintenance, newborn, gestation, lactation, etc.).	AS.03.02.02.a
18.05	Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.	AS.03.02.02.b
18.06	Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.	AS.03.02.02.c
18.07	Examine the purpose, impact and mode of action of feed additives and growth promotions in animal production.	AS.03.02.03.a
18.08	Compare and contrast methods that utilize feed additives and growth promotants with production practices that do not, (e.g., organic versus conventional production methods).	AS.03.02.03.b
18.09	Make and defend decisions regarding whether to use feed additives and growth promotants after researching and considering scientific evidence, production system needs and goals, and input from industry professionals.	AS.03.02.03.c
18.10	Analyze different feed labels and apply feed label regulations.	
19.0	Evaluate animals for breeding readiness and soundness. The student will be able to:	AS.04.01
19.01	Explain how age, size, life cycle, maturity level and health status affect the reproductive efficiency of male and female animals.	AS.04.01.02.a

CTE Standards and Benchmarks		National Standards
19.02	Assess and describe factors that lead to reproductive maturity.	AS.04.01.02.b
19.03	Evaluate and select animals for reproductive readiness.	AS.04.01.02.c
19.04	Summarize the importance of efficient and economic reproduction in animals.	AS.04.02.03.a
19.05	Identify reproductive problems that occur in animals.	AS.04.02.03.b
19.06	Determine when to treat or cull animals with reproductive problems.	AS.04.02.03.c
20.0	Explain the reproductive system and breeding of selected animals. The student will be able to:	
20.01	Identify phenotypically superior breeding animals.	AS.04.02.01.c
20.02	Describe breeding techniques.	
20.03	Analyze the care needs for breeding stock in each stage of growth.	AS.04.02.04.b
20.04	Describe the proper care for newborn offspring.	
21.0	Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare. The student will be able to:	AS.07.01
21.01	Explain methods of determining animal health and disorders.	AS.07.01.02.a
21.02	Perform simple health-check evaluations on animals and practice basic emergency response procedures related to animals.	AS.07.01.02.b
21.03	Identify and describe common illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites, and physiological disorders.	AS.07.01.03.b
21.04	Identify and summarize characteristics of causal agents and vectors of diseases and disorders in animals.	AS.07.01.04.a
21.05	Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites, and disorders among animals.	AS.07.01.04.b
21.06	Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments.	AS.07.01.04.c
21.07	Explain the clinical significance of common considerations in veterinary treatments, such as aseptic techniques.	AS.07.01.05.a
22.0	Apply basic principles of veterinary science to animal production.	
22.01	Assess the safety and effectiveness of facilities and equipment used for surgical and nonsurgical veterinary treatments and procedures.	AS.07.01.05.b

CTE Standards and Benchmarks		National Standards
	22.02 Identify and describe surgical and nonsurgical treatments and procedures in animal health care objectives.	AS.07.01.05.c
23.0	Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level. The student will be able to:	AS.07.02
	23.01 Summarize the importance of biosecurity to the animal industry at multiple levels (e.g., local, state, national, global).	AS.07.02.01.a
	23.02 Analyze procedures at the local, state, and national levels to ensure biosecurity of the animal industry.	AS.07.02.01.b
	23.03 Identify and describe zoonotic diseases including their historical significance and potential future implications.	AS.07.02.02.a
	23.04 Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.	AS.07.02.02.b
	23.05 Research and evaluate the effectiveness of zoonotic disease prevention methods and procedures to identify those that are best suited to ensure public safety and animal welfare.	AS.07.02.02.c
24.0	Demonstrate knowledge of preventive medicine and disease control. The student will be able to:	
	24.01 Describe procedures for prescribed oral medications.	
	24.02 Describe the process for administering medications by injection.	
	24.03 Describe the procedure for safe disposal of biologicals.	
	24.04 Discuss the term immunology and active and passive immunity.	
	24.05 Describe the process for fecal sample collection, slide preparation, and examination.	
25.0	Select animals for specific purposes and maximum performance based on anatomy and physiology. The student will be able to:	
	25.01 Identify and summarize ways an animal's health can be affected by anatomical and physiological disorders.	AS.06.03.01.a
	25.02 Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.	AS.06.03.01.b
	25.03 Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth, and reproduction.	AS.06.03.01.c
	25.04 Compare and contrast procedures to develop an animal to reach its highest performance potential with respect to its anatomical and physiological characteristics.	AS.06.03.02.b
	25.05 Choose, implement and evaluate sustainable and efficient procedures (e.g., selection, housing, nutrition and management) to produce consistently high-quality animals that are well suited for their intended purposes.	AS.06.03.02.c

CTE Standards and Benchmarks		National Standards
	25.06 Evaluate and select products from animals based on industry standards.	AS.03.03.03.b
26.0	Prepare, groom, exhibit, and market animals. The student will be able to:	
	26.01 Groom selected animals for exhibition.	
	26.02 Train animals for show and/or exhibition.	
	26.03 Demonstrate proper techniques for exhibiting and animals.	
	26.04 Measure animal growth using a scale.	
	26.05 Identify various marketing outlets.	
	26.06 Describe methods of restraining, loading, handling, and transporting animals safely.	
	26.07 Determine market grades of animals and animal products.	
	26.08 Identify components of shipping and health certificates.	
27.0	Maintain and analyze records. The student will be able to:	
	27.01 Maintain and analyze animal records.	
	27.02 Discuss the legal requirements of maintaining animal health records and maintain and analyze animal health records.	
	27.03 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	
	27.04 Prepare and maintain Supervised Agricultural Experience (SAE) records.	
28.0	Explain the components of the American business system. (sole proprietorship, partnership, corporation, limited liability company, cooperative). The student will be able to:	
	28.01 Describe the five basic ways American business is organized.	
	28.02 Distinguish and identify between the characteristics of each method of doing business.	
	28.03 Evaluate the advantages and disadvantages provided by each business method.	
	28.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.	
	28.05 Distinguish and identify between the three types of cooperative structures and their functions. (marketing, service, purchasing)	

Florida Department of Education
Student Performance Standards

Course Title: **Animal Science and Services 4**
Course Number: **8106230**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting, and marketing animals; operation, maintenance and repair of equipment.

CTE Standards and Benchmarks		National Standards
29.0	Apply animal health practices. The student will be able to:	
29.01	Administer prescribed oral medications.	
29.02	Locate injection points of selected animals.	
29.03	Sterilize instruments and supplies.	
29.04	Interpret and follow directions on medications and animal health aids, including withdrawal periods.	
29.05	Dip, spray, or dust animals for external parasites (under supervision).	
29.06	Dispose of empty chemical and medical containers as prescribed.	
29.07	Store medications and chemicals safely and securely.	
29.08	Dispose of biomedical waste and by products (needles, scalpel blades, medicines, etc.).	
30.0	Maintain equipment and facilities. The student will be able to:	
30.01	Clean and disinfect pens, cages, feeders, waterers, trailers, and other equipment according to Best Management Practices.	
30.02	Dispose of animal residue and waste according to Best Management Practices.	
30.03	Prepare and maintain equipment and instruments.	
30.04	Repair and maintain pens, cages and other facilities and structures.	
30.05	Create a clean, sanitary, and healthy environment for animals.	

CTE Standards and Benchmarks		National Standards
31.0	Operate, maintain, and repair machinery and equipment. The student will be able to:	
31.01	Use equipment-operator and repair manuals.	
31.02	Operate, service, and maintain equipment.	
31.03	Maintain records of equipment maintenance and repair.	
31.04	Prepare equipment for storage.	
31.05	Demonstrate safety practices in operating machinery and equipment.	
32.0	Investigate emerging technologies in Animal Science. The student will be able to:	
32.01	Identify new technologies in animal science.	
32.02	Research emerging technologies and determine their impact on animal industry and society.	
33.0	Apply scientific principles in the selection and breeding of animals. The student will be able to:	
33.01	Compare and contrast the use of genetically superior animals in the production of animals and animal products.	AS.04.02.01.b
33.02	Identify and categorize natural and artificial breeding methods (e.g., natural breeding, artificial insemination, estrous synchronization, flushing, cloning, etc.).	AS.04.03.01.a
33.03	Select animal breeding methods based on reproductive and economic efficiency.	AS.04.03.01.c
33.04	Examine the use of quantitative breeding values (e.g., EPDs, Performance records, pedigrees) in the selection of genetically superior breeding stock.	AS.04.03.04.a
33.05	Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.	AS.04.03.04.b
33.06	Select and assess animal performance based on quantitative breeding values for specific characteristics.	AS.04.03.04.c
33.07	Identify and summarize the advantages and disadvantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer (e.g., cost, labor, equipment, etc.).	AS.04.03.03.a
33.08	Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.	AS.04.03.03.b
33.09	Create and evaluate plans and procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices.	AS.04.03.03.c
33.10	Calculate the potential economic benefits of natural versus artificial breeding methods.	AS.04.03.01.b

CTE Standards and Benchmarks		National Standards
	33.11 Analyze the materials, methods, and processes of artificial insemination.	AS.04.03.02.a
	33.12 Demonstrate artificial insemination techniques.	AS.04.03.02.b
34.0	Maintain and analyze records. The student will be able to:	
	34.01 Maintain and analyze animal records.	
	34.02 Maintain machinery and equipment records.	
	34.03 Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	
	34.04 Prepare and maintain Supervised Agricultural Experience (SAE) records.	
35.0	Manage pasture and forage crops. The student will be able to:	
	35.01 Compare pasture, forage and feed crop production and harvesting systems.	
	35.02 Assist in determining pasture and forage needs.	
	35.03 Take a forage sample and interpret results.	
	35.04 Determine range and pasture quality.	
	35.05 Assist in the development of a plan for the rotation of fields, pens and pastures.	
36.0	Understand the relationship of animal production and the environment. The student will be able to:	
	36.01 Evaluate the relationship between animal agriculture on the environment.	
	36.02 Outline methods of balancing the effects of animal agriculture on the environment.	
	36.03 Describe BMPs (Best Management Practices) to balance the impact of animal agriculture on the environment.	
	36.04 Determine positive effects of animal agriculture on the environment.	
37.0	Evaluate the effects of environmental conditions on animals. The student will be able to:	
	37.01 Identify optimal environmental conditions for animals.	
	37.02 Describe the effects of environmental conditions on animal populations and performance.	

CTE Standards and Benchmarks		National Standards
	37.03 Establish and maintain favorable environmental conditions for animal growth and performance.	
38.0	Identify and interpret environmental issues and regulations pertaining to animal industry. The student will be able to:	
	38.01 Determine environmental issues pertinent to your area.	
	38.02 Calculate the economic impact of environmental regulations on the industry.	
	38.03 Discuss emerging technologies and determine their effectiveness as related to environmental quality.	
	38.04 Evaluate an animal facility to determine if standards have been met.	
	38.05 Design a facility that meets standards for the legal, safe, ethical, and efficient production of animals.	

Florida Department of Education
Student Performance Standards

Course Title: **Animal Science and Services 5**
Course Number: **8106240**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting and marketing animals; operation, maintenance and repair of equipment.

CTE Standards and Benchmarks		National Standards
39.0	Discuss animal marketing techniques. The student will be able to:	
39.01	Collect and interpret market reports and identify market outlets for companion and food-producing animals.	
39.02	Determine market grades of animal and animal products.	
39.03	Examine the impacts of industry promotion campaigns.	
40.0	Apply advanced animal health practices. The student will be able to:	
40.01	Administer prescribed injections (under supervision).	
40.02	Discuss proper disposal of deceased animals.	
40.03	Determine when euthanasia is appropriate.	
40.04	Discuss AVMA approved methods of euthanasia.	
40.05	Discuss BMPs (Best Management Practices) associated with castration, dehorning, docking, debeaking, and/or another component of livestock management.	
41.0	Maintain and analyze records. The student will be able to:	
41.01	Maintain and analyze animal records.	
41.02	Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	
41.03	Prepare and maintain Supervised Agricultural Experience (SAE) records.	
42.0	Perform emergency first aid on animals. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	42.01 Evaluate the health status of the animals.	
	42.02 Isolate injured animals.	
	42.03 Demonstrate how to properly cleanse wounds and apply antiseptic.	
	42.04 Immobilize fractured limbs.	
	42.05 Identify and stop external bleeding.	
	42.06 Know when to seek additional medical attention for animals.	
43.0	Implement procedures to ensure that animal products are safe. The student will be able to:	
	43.01 Research and summarize animal production practices that may pose health risks.	AS.02.02.02.a
	43.02 Analyze consumer concerns with animal production practices relative to human health.	AS.02.02.02.b
	43.03 Research and evaluate programs to assure the safety of animal products for consumption.	AS.02.02.02.c
	43.04 Identify and describe animal tracking systems used in animal systems (e.g., livestock, companion animal, exotics, etc.).	AS.02.02.03.a
	43.05 Analyze and summarize the impact of animal trace-back capabilities on producers and consumers.	AS.02.02.03.b
	43.06 Evaluate the effectiveness of animal and/or premise identification programs for a given species.	AS.02.02.03.c
44.0	Identify, select, and breed food-producing animals. The student will be able to:	
	44.01 Appraise animal conformation and desirable characteristics and breeds.	
	44.02 Justify reasons for culling offspring.	
	44.03 Identify signs of parturition.	
	44.04 Identify common disorders of parturition.	
	44.05 Prepare animals and facilities for parturition.	
	44.06 Assist in the delivery of newborn animals.	
45.0	Analyze county, state and federal agencies that support the animal industry. The student will be able to:	
	45.01 Identify agencies that support the animal industry.	

CTE Standards and Benchmarks	National Standards
45.02 Research technical assistance, disaster relief, grants, and other available programs.	
45.03 Inquire about career opportunities within these agencies.	

Florida Department of Education
Student Performance Standards

Course Title: **Animal Science and Services 6**
Course Number: **8106250**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of nutrition; grooming, exhibiting, and marketing animals; operation, maintenance and repair of equipment.

CTE Standards and Benchmarks		National Standards
46.0	Plan routine management of food-producing animals and facilities. The student will be able to:	
46.01	Schedule feeding and care of animals.	
46.02	Order supplies and animal feeds.	
46.03	Develop training and exercise schedule for animal.	
46.04	Develop a plan for routine maintenance of equipment and facilities.	
46.05	Assist in the planning of a routine animal health and preventative medication program.	
46.06	Implement and maintain sanitary conditions for animals, including young.	
46.07	Separate non-compatible animals.	
46.08	Observe animals on a regular basis for problems or stress.	
46.09	Develop a calendar of operations for a selected animal operation.	
47.0	Maintain and analyze records. The student will be able to:	
47.01	Analyze and utilize production, performance and breeding records, using computer applications.	
47.02	Identify major sources of credit.	
47.03	Evaluate leasing and renting agreements.	
47.04	Evaluate need for liability and other insurance.	

CTE Standards and Benchmarks		National Standards
47.05	Analyze records to determine efficiency of operation.	
47.06	Maintain machinery, equipment and facilities inventory records.	
47.07	Maintain breeding records.	
47.08	Prepare an annual budget.	
47.09	Maintain and analyze basic business records (inventory, depreciation, receipts, and expenses) using computer applications.	
47.10	Plan a work schedule.	
47.11	Maintain personnel and labor records.	
47.12	Maintain supervised agricultural experience records.	
47.13	Discuss the legal requirements of maintaining animal health records, and maintain and analyze health records.	
47.14	Maintain chemical-use and water-use records, etc.	
47.15	Prepare and maintain Supervised Agricultural Experience (SAE) records.	
48.0	Design animal housing, equipment and handling facilities for animal production. The student will be able to:	
48.01	Identify facilities needed to house and produce each animal species safely and efficiently.	AS.07.01.01.a
48.02	Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility.	AS.07.01.01.b
48.03	Design an animal facility, focusing on animal requirements, efficiency, safety, and ease of handling.	AS.07.01.01.c
48.04	Identify equipment and handling facilities used in modern animal production.	AS.07.01.02.a
48.05	Explain how modern equipment and handling facilities enhance the safe and economic production of animals.	AS.07.01.02.b
48.06	Select equipment and implement animal handling procedures and improvements to enhance production efficiency.	AS.07.01.02.c
49.0	Comply with government regulations and safety standards for facilities used in animal production. The student will be able to:	
49.01	List the general standards that must be met in facilities for animal production. (e.g., environmental, zoning, construction)	AS.07.02.01.a
49.02	Evaluate an animal facility to determine if standards have been met.	AS.07.02.01.b

CTE Standards and Benchmarks		National Standards
	49.03 Design a facility that meets standards for the legal, safe, ethical, and efficient production of animals.	AS.07.02.01.c
50.0	Identify and interpret rules, policy, and regulations affecting the animal industry. The student will be able to:	
	50.01 Maintain a file of current animal rules and regulations.	
	50.02 Secure professional services and information.	
	50.03 Observe EPA pesticide use regulations.	
	50.04 Identify the procedures and requirements for obtaining a restricted use pesticide applicator's license.	
	50.05 Observe regulations regarding the use of medications and growth stimulants.	
	50.06 Observe state and federal regulations regarding disease testing/eradication programs and other programs.	
	50.07 Identify applicable land-use and zoning regulations.	
	50.08 Identify agencies affecting natural resource utilization (e.g., DNR, DEP, EPA).	
	50.09 Identify agencies regulating employee/employer relations (e.g., OSHA).	
	50.10 Investigate opportunities to impact policy making at the local, state, and national level.	
51.0	Evaluate the effects of environmental conditions on animals. The student will be able to:	
	51.01 Identify optimal environmental conditions for animals.	AS.08.02.01.a
	51.02 Describe the effects of environmental conditions on animal populations and performance.	AS.08.02.01.b
	51.03 Establish and maintain favorable environmental conditions for animal growth and performance.	AS.08.02.01.c
52.0	Identify and interpret environmental issues and regulations pertaining to animal industry. The student will be able to:	
	52.01 Determine environmental issues pertinent to your area.	
	52.02 Calculate the economic impact of environmental regulations on the industry.	
	52.03 Discuss emerging technologies and determine their effectiveness as related to environmental quality.	
	52.04 Evaluate an animal facility to determine if standards have been met.	
	52.05 Design a facility that meets standards for the legal, safe, ethical, and efficient production of animals.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org.

Extended Student Supervision

Because of the production and marketing cycle of the animal industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Agritechnology**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8106800
CIP Number	0101039901
Grade Level	9-12
Program Length	3 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	19-4011 -- Agricultural and Food Science Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in animal and plant production and processing; agriculture marketing; agricultural mechanics; employability skills; mathematics; basic science; biological sciences; communications; and human-relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirements
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit		3	EQ
8106820	Agritechnology 1		1 credit	19-4011	2	CT
8106830	Agritechnology 2		1 credit	19-4011	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Agritechnology 1

09.0 Explore the scope of the agriscience industry.
10.0 Determine proper animal health and nutrition.
11.0 Identify components of reproduction.
12.0 Identify procedures in animal production.
13.0 Develop procedures for exhibiting animals.
14.0 Compare, select, and use plant production systems.
15.0 Investigate proper methods to fertilize plants and crops.
16.0 Operate, maintain, and service facilities, tools, and equipment.
17.0 Apply principles of agribusiness finance.
18.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
19.0 Examine the scope of career opportunities in and the importance of agriculture to the economy.

Agritechnology 2

20.0 Analyze the scope of the Agriscience industry.
21.0 Recommend steps for proper animal health and nutrition.
22.0 Select, and use plant production systems.
23.0 Fertilize plants and crops.
24.0 Irrigate plants and crops.
25.0 Control plant pests.
26.0 Maintain, and service facilities, tools, and equipment.
27.0 Describe procedures for harvesting and marketing agricultural products.
28.0 Compare principles of agribusiness finance.
29.0 Explain the components of the American business system.
30.0 Investigate agricultural cooperatives structure and function.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Agritechnology 1**
Course Number: **8106820**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agriscience industry careers; prevention and treatment of livestock diseases; livestock anatomy; wholesale cuts of meat; animal reproduction and identification; animal safety; animal-health certification; plant growth; plant fertilization; safe use of pesticides; maintenance of tools and equipment; record keeping; and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Explore the scope of the agriscience industry. The student will be able to:	
09.01	Investigate career opportunities in agriscience industries.	CS.05.01.01.a
09.02	Describe training requirements for entry and advancement in agriscience careers.	CS.05.02.02.a
10.0	Determine proper animal health and nutrition. The student will be able to:	
10.01	Demonstrate proper methods to clean and disinfect animal equipment and facilities.	
10.02	Explain proper disposal of animal waste with regards to sanitation, economics and environmental implications.	AS.08.01.01.a
10.03	Describe a livestock animals digestive system.	
10.04	Describe nutritional requirements of animals.	AS.03.01.01.a
11.0	Identify components of reproduction. The student will be able to:	
11.01	Examine livestock and poultry reproductive anatomy.	AS.04.01.01.b
11.02	Explain the reproductive cycles of commercially important animals.	
11.03	Compare and select appropriate breeding methods for different agricultural enterprises.	
11.04	Describe approved care for newborn animals.	AS.04.02.04.a
12.0	Identify procedures in animal production. The student will be able to:	

CTE Standards and Benchmarks		National Standards
12.01	Compare and contrast desirable characteristics of breeding and market animals.	AS.04.02.01.b
12.02	Evaluate wholesale cuts of beef, pork, lamb and poultry.	
12.03	Describe methods of animal identification.	
12.04	Describe methods of restraining, loading, handling and transporting animals safely.	
13.0	Develop procedures for exhibiting animals. The student will be able to:	
13.01	Demonstrate the procedures for preparing, maintaining and handling livestock.	
13.02	Compare and contrast appropriate livestock evaluation criteria.	AS.06.03.02.a
13.03	Prepare appropriate registrations, shipping and health certificates required for exhibiting or marketing animals.	
13.04	Demonstrate appropriate grooming and showmanship skills.	
14.0	Compare, select, and use plant production systems. The student will be able to:	
14.01	Compare different plant production systems. (Seed, cutting, air layer and tissue culture).	
14.02	Propagate, transplant and grow plants.	
14.03	Select and prepare a site and/or a seedbed for planting.	
14.04	Identify methods of pruning plants to achieve desired growth and to maintain health.	
14.05	Identify types of hydroponic systems.	
14.06	Identify methods used in hydroponic systems.	
15.0	Investigate proper methods to fertilize plants and crops. The student will be able to:	
15.01	Interpret information on a fertilizer label.	
15.02	Compare sources and forms of nutrients.	
15.03	Determine methods of applying fertilizer materials.	
15.04	Collect soil sample to determine nutrient levels.	PS.01.03.03.a
15.05	Test for pH and soluble salts.	

CTE Standards and Benchmarks		National Standards
16.0	Operate, maintain, and service facilities, tools and equipment. The student will be able to:	
16.01	Use and maintain hand tools and power equipment (e.g., power saws, welders).	PST.02.02.02.b
16.02	Describe maintenance and service of small engines.	
16.03	Introduce science principles as applied in selected mechanical applications (e.g., hydraulics, and internal combustion).	
17.0	Apply principles of agribusiness finance. The student will be able to:	
17.01	Identify components of balance sheets and income statements.	ABS.02.01.01.a
17.02	Identify major sources of credit for agribusiness.	ABS.03.02.02.a
17.03	Complete a business loan application.	
17.04	Maintain and interpret agribusiness financial records including depreciation, inventory, and budgets.	
18.0	Evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:	
18.01	Assess the agricultural impact upon the US gross national product and the total global economy.	CS.02.02.03.b
18.02	Investigate local, state and national regulatory laws, industry regulations and legislation for agricultural businesses.	
18.03	Identify and describe the primary government agencies involved with agriculture.	
18.04	Research new and emerging technologies and their impact on the economy.	CS.01.02.02.c
18.05	Describe the value of the food and agribusiness industry.	
19.0	Examine the scope of career opportunities in and the importance of agriculture to the economy. The student will be able to:	
19.01	Define and explore agriculture and agribusinesses and their role in the economy.	CS.02.02.03.a
19.02	Evaluate and explore the agribusiness career opportunities in agriculture.	
19.03	Compare how key organizational structures and processes affect organizational performance and the quality of products and services.	

Florida Department of Education
Student Performance Standards

Course Title: **Agritechnology 2**
Course Number: **8106830**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of welding; small gasoline engine service and repair; preventative maintenance procedures; irrigation system repair; refrigeration; new and emerging technologies; financial management skills; and employability skills.

CTE Standards and Benchmarks		National Standards
20.0	Analyze the scope of the agriscience industry. The student will be able to:	
20.01	Identify and describe the importance of professional and trade organizations.	
20.02	Examine and interpret trade journals, and academic research in the agriscience industry.	
20.03	Complete a job application.	
21.0	Recommend steps for proper animal health and nutrition. The student will be able to:	
21.01	Recognize, describe, and demonstrate prevention and treatment of common animal diseases, disorders and pests.	AS.07.01.03.b
21.02	Read, interpret, and demonstrate correct uses of pesticides, medication and other additives according to their labels.	
21.03	Formulate and compute least-cost feed rations.	AS.03.01.02.b
21.04	Select and apply growth stimulators and implants.	AS.03.02.03.c
21.05	Determine feeding rates and methods of feeding animals.	
22.0	Select, and use plant production systems. The student will be able to:	
22.01	List the leading local (community) varieties of commonly grown crops for commercial production.	
22.02	Recommend varieties of local commercial plants and field crops.	
22.03	Identify the recommended planting rate, spacing requirements and growth times for common garden crops.	
22.04	Describe the operation of and adjustment of plant production equipment	

CTE Standards and Benchmarks		National Standards
23.0	Fertilize plants and crops. The student will be able to:	
23.01	Develop fertilization schedules and calculate fertilizer rates for plants.	PS.01.03.06.c
23.02	Identify common nutrient-deficiency symptoms in plants.	PS.01.03.01.b
23.03	Calibrate fertilization equipment and fertilize plants.	PS.01.03.04.c
24.0	Irrigate plants and crops. The student will be able to:	
24.01	Recognize soil and plant conditions indicating irrigation needs and develop an irrigation schedule.	
24.02	Compare and select irrigation equipment and methods.	
24.03	Install, operate, maintain, and repair irrigation equipment.	
24.04	Develop Best Management Practices (BMP) for water use.	
25.0	Control plant pests. The student will be able to:	
25.01	Compare and contrast common plant pests and their damages.	PS.03.03.01.a
25.02	Diagram life cycles of insects, pests and diseases.	PS.03.03.02.a
25.03	Interpret the procedures and requirements for obtaining a restricted-use-pesticide operator's license.	
25.04	Select, mix and apply a no restricted chemical according to the label and local, state, federal and EPA regulations.	
25.05	Describe biological, chemical and cultural methods of controlling plant pests.	PS.03.03.03.c
25.06	Develop Best Management Practices for pest management.	
26.0	Maintain, and service facilities, tools, and equipment. The student will be able to:	
26.01	Discuss basic facility maintenance, installation or repair. (e.g., welding, electricity, plumbing, fencing, construction)	
26.02	Safely operate, maintain, service and repair equipment.	
27.0	Describe procedures for harvesting and marketing agricultural products. The student will be able to:	
27.01	Determine maturity, condition, quality and volume of products (produced by program) to be harvested.	

CTE Standards and Benchmarks		National Standards
	27.02 Describe procedures for harvesting products (produced by program).	PS.03.05.01.a
	27.03 Collect and interpret market reports and identify market outlets for agricultural products (produced by program).	
	27.04 Organize a marketing program for an agricultural product (produced by program or student).	
	27.05 Assess kinds and types of storage facilities for agricultural products (produced by program).	PS.03.05.04.b
	27.06 Grade, treat, pack, and/or store harvested products (produced by program).	PS.03.05.05.b
28.0	Compare principles of agribusiness finance. The student will be able to:	
	28.01 Explain the purposes and structures of contracts, leases, deeds and insurance policies.	
	28.02 Complete a State FFA Degree or Proficiency Applications.	
	28.03 Identify tax structure of agricultural business. (ex., Property tax, intangible taxes, income taxes)	
29.0	Explain the components of the American business system. The student will be able to:	
	29.01 Describe the five basic ways American business is organized.	
	29.02 Distinguish and identify between the characteristics of each method of doing business.	
	29.03 Evaluate the advantages and disadvantages provided by each business method.	
	29.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.	
30.0	Investigate agricultural cooperatives structure and function. The student will be able to:	
	30.01 Explain the definition of a cooperative.	
	30.02 Explain the history of cooperative principles and practices.	
	30.03 Describe the five areas that classify cooperative structure.	
	30.04 Distinguish and identify between the five types of cooperative structure and their functions.	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Veterinary Assisting**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8115110
CIP Number	0101830101
Grade Level	9-12
Program Length	5 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	31-9096 -- Veterinary Assistants and Laboratory Animal Caretakers 29-2056 -- Veterinary Technologists and Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to broad, transferable skills and stresses understanding and demonstration of the following elements of the veterinary assisting industry: planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues. The program also provides supplemental training for persons previously or currently employed as veterinary assistants.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of five courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8111510	Veterinary Assisting 1	AGRICULTUR 1 @2 VET ASSIST 7G	1 credit	31-9096	3	CT
8111540	Veterinary Assisting 2		1 credit	31-9096	3	CT
8111550	Veterinary Assisting 3		1 credit	31-9096	3	CT
8111520	Veterinary Assisting 4		1 credit	31-9096	3	CT
8111530	Veterinary Assisting 5		1 credit	29-2056	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Veterinary Assisting 1

01.0 Describe veterinary science and the role of animals in society.
02.0 Describe the socioeconomic role of veterinary sciences on the companion animal livestock industries.
03.0 Discuss the human-animal bond and its effects on human health.
04.0 Demonstrate the proper use of veterinary science terminology.
05.0 Identify careers in the animal industry.
06.0 Practice safety.
07.0 Recognize normal and abnormal animal behaviors.
08.0 Restrain and control companion and livestock animals.
09.0 Identify common breeds of companion animals and husbandry practices.
10.0 Demonstrate human-relations, communications and leadership through FFA activities.

Veterinary Assisting 2

11.0 Demonstrate basic first aid for companion and livestock animals.
12.0 Demonstrate the use of tools, equipment, and instruments in the veterinary science and companion animal industry.
13.0 Demonstrate proper techniques in taking vital signs.
14.0 Investigate the common breeds and husbandry practices for species of livestock animals.
15.0 Identify parts and functions of various systems of common companion and livestock animals.
16.0 Explain the various methods of animal identification.

Veterinary Assisting 3

17.0 Demonstrate knowledge of animal control and Human Society organizations.
18.0 Describe the problems, causes, and solutions of animal overpopulation.
19.0 Locate and interpret animal-related laws, in state statutes, or local ordinances.
20.0 Identify the different nutritional requirements of selected species.
21.0 Explain the breeding practices of common companion and livestock animals.
22.0 Investigate the common husbandry practices and daily care of companion animals, exotic animals, and fish.
23.0 Demonstrate knowledge of preventive medicine and disease control.
24.0 Demonstrate human-relations, communications, leadership, and employability skills.

Veterinary Assisting 4

25.0 Differentiate between animal welfare and animal rights.
26.0 Explain the role of animals in research.
27.0 Maintain and analyze records.
28.0 Explain proper sanitation for animal facilities.
29.0 Explain diagnostic testing and use of equipment.

30.0 Describe the process for handling a suspected rabies patient, and the process for other deceased animals.
31.0 Describe internal and external parasites and control methods.

Veterinary Assisting 5
32.0 Groom selected companion and livestock animals.
33.0 Describe exotic animals and the effects of captivity on them.
34.0 Assess techniques used in surgical assisting and surgical preparation.
35.0 Explain principles of pharmacology.
36.0 Explain proper methods of syringe and hypodermic needle use.

Florida Department of Education
Student Performance Standards

Course Title: **Veterinary Assisting 1**
Course Number: **8111510**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in areas such as the history of the animal industry; applied scientific and technological concepts; safety; terminology; careers; breed identification; animal care and human relations skills.

CTE Standards and Benchmarks	
01.0	Describe veterinary science and the role of animals in society. The student will be able to:
01.01	Define veterinary science.
01.02	Identify key components in the domestication of animals.
01.03	Choose current issues facing the animal industry today and describe the effect of each on society.
02.0	Describe the socioeconomic role of veterinary sciences on the companion animal and livestock industries. The student will be able to:
02.01	Summarize the history of the veterinary science, companion animal and livestock industry.
02.02	Discuss the role of companion animals on the veterinary science industry.
02.03	Discuss the role of livestock animals on the veterinary science industry.
03.0	Discuss the human-animal bond and its effects on human health. The student will be able to:
03.01	*Describe the human-animal bond and its influence on veterinary care.*
03.02	*Compare and contrast different types of human-animal bonds for companion animals, working animals and livestock.*
03.03	Discuss the positive health effects on people resulting from their interaction with animals.
03.04	Discuss local, state, and national programs that use human-animal interaction as a therapy tool.
03.05	Discuss stages of grief of animal loss.
04.0	Demonstrate the proper use of veterinary science terminology. The student will be able to:

CTE Standards and Benchmarks	
	04.01 Define common veterinary and medical terms, including directional terminology.
	04.02 Compile a list of prefixes, suffixes, and root words for veterinary medical terminology.
	04.03 Categorize gender and species-related terminology.
	04.04 List common medical and veterinary abbreviations.
05.0	Identify careers in the animal industry. The student will be able to:
	05.01 Differentiate between entry and advanced level animal-industry careers.
	05.02 Identify professional organizations and trade journals in the animal industry.
	05.03 Investigate career opportunities in the veterinary science, companion animal, and large animal industry; also identify degree or credential needed to prepare for those careers.
	05.04 Using national or state credentialing agencies as a reference, distinguish between a Veterinary Assistant, Credentialed Veterinary Assistant, Veterinary Technician, Credentialed Veterinary Technician, and Veterinary Technologist.
	05.05 Investigate requirements necessary to earn and maintain Veterinary Assisting Certification.
06.0	Practice safety. The student will be able to:
	06.01 Recognize and avoid potential safety hazards (physical, chemical, biological and zoonotic).
	06.02 Utilize proper safety precautions and procedures when working in the hospital and/or animal handling areas.
	06.03 Demonstrate knowledge on how to use personal protective equipment- PPE. (wears gloves, goggles, face mask, ear plugs, apron, gown, cap, and shoe covers when needed)
	06.04 Locate and demonstrates use of an eye wash solution or station.
	06.05 Locate first aid kit and fire extinguisher.
	06.06 Explain OSHA (Occupational Safety and Health Act) and its regulations pertaining to a veterinary practice, including sanitation, safety of employees and the employee's right to know of potential work place hazards through SDS (Safety Data Sheets) and the written hazard communication plan.
	06.07 Demonstrate knowledge of OSHA regulations regarding the handling, placement and disposition of sharps and bio-hazardous material.
	06.08 Handle and use disposable "sharps" containers in a safe manner.
	06.09 Explain correct labeling of secondary containers with appropriate safety information.

CTE Standards and Benchmarks	
	06.10 Practice safety precautions around animals, list the most common causes of animal related accidents.
07.0	Recognize normal and abnormal animal behaviors. The student will be able to:
	07.01 Identify instinctive and learned behaviors.
	07.02 Differentiate between normal and abnormal behavioral characteristics of animals.
	07.03 Recognize signs of aggressive animal behaviors.
	07.04 Describe behavioral changes due to aging.
08.0	Restrain and control companion and livestock animals. The student will be able to:
	08.01 Discuss the proper method for placing large animals in a stall, paddock, and trailer.
	08.02 Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans. • Lifting positioning and restraining animals. • Position an animal in sternal dorsal and lateral recumbency. • restraint of a small dog on an exam table. • restraint of a cat on an exam table. • restraint of a large dog on and exam table, lift table, and on the floor. • place a lead on a dog slip lead and standard leash.
	08.03 Demonstrate verbal and physical restraint of animals.
	08.04 Demonstrate how to match appropriate level of restraint for an individual animal's level of resistance and situation.
	08.05 Explain appropriate methods for placing and removing animals from kennels.
	08.06 Identify venipuncture sites and accepted restraint for companion and livestock animals; [ex., cephalic vein (cat & dog), jugular vein (cat & dog), femoral vein (cat), saphenous vein (dog)jugular (horse & goat), tail (cow & pig)]
	08.07 Demonstrate use of muzzle on a dog using commercial, leash, and gauze muzzles of appropriate size.
	08.08 Demonstrate currently accepted standards for restraint of the cat including towels, scruff technique, commercial muzzles, cat bags, leather gloves, and the squeeze cage.
	08.09 Explain methods of restraint for exotic and avian animals.
	08.10 Identify the appropriate restraining methods for the following: • Halter, tie and lead horses and cattle. • Application of twitch, nose tongs.

CTE Standards and Benchmarks	
	• Restrain sheep, goats, and swine. • Restrain poultry.
08.11	Discuss chemical restraints of animals.
09.0	Identify common breeds of companion animals and husbandry practices. The student will be able to:
09.01	Identify canine breeds and list breed characteristics and husbandry practices.
09.02	Identify feline breeds and list breed characteristics and husbandry practices.
10.0	Demonstrate human-relations, communications, and leadership through FFA activities. The student will be able to:
10.01	Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.
10.02	Delineate the major events in the history of the FFA.
10.03	Develop, implement, and maintain work-based learning through a Supervised Agricultural Experience (SAE) program.
10.04	Collect, interpret, and analyze data using an organized record-keeping system.

Florida Department of Education
Student Performance Standards

Course Title: **Veterinary Assisting 2**
Course Number: **8111540**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas such as basic first aid; scientific and technological; tools and equipment; breed identification; and functions of systems.

CTE Standards and Benchmarks	
11.0	Demonstrate basic first aid for companion and livestock animals. The student will be able to:
11.01	Recognize emergency health (physical and behavioral) status.
11.02	Describe procedures to restrain and move injured animals.
11.03	Demonstrate hemorrhage control.
11.04	Dress wounds and punctures.
11.05	Demonstrate the correct emergency procedures for shock, burns, heatstroke, and fractures.
11.06	Demonstrate companion animal CPR.
11.07	Recognize allergic reactions and toxicity.
12.0	Demonstrate the use of tools, equipment, and instruments in the veterinary science and companion animal industry. The student will be able to:
12.01	Identify, demonstrate, and maintain the proper tools, equipment, and instruments for common veterinary procedures for: • Small animal • Livestock • Exotics
12.02	Demonstrate the ability to use an equipment or instrument manual.
13.0	Demonstrate proper techniques in taking vital signs. The student will be able to:
13.01	Obtain and record the TPR (temperature, pulse, and respiratory rate), MM (mucus membrane color), CRT (capillary refill time) with minimal discomfort to pet.

CTE Standards and Benchmarks	
	13.02 Demonstrate how to use, clean, and store thermometers.
	13.03 Identify normal and abnormal range for each parameter (TPR, MM, and CRT).
14.0	Investigate the common breeds and husbandry practices for species of livestock animals. The student will be able to:
	14.01 Identify bovine breeds and their characteristics, and husbandry practices.
	14.02 Identify ovine breeds and their characteristics and husbandry practices.
	14.03 Identify caprine breeds and their characteristics and husbandry practices.
	14.04 Identify porcine breeds and their characteristics and husbandry practices.
	14.05 Identify equine breeds and their characteristics and husbandry practices.
	14.06 Identify poultry breeds and their characteristics and husbandry practices.
15.0	Identify parts and functions of various systems of common companion and livestock animals. The student will be able to:
	15.01 Identify internal and external anatomy of common companion and livestock animals.
	15.02 Identify parts, major organ, functions, and common diseases of the following systems of animals using correct terminology:
	• Identify the general function of the respiratory system and the major organs.
	• Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton.
	• Identify the general function of the muscular system and major groups of muscles.
	• Identify the general function of the digestive system; differentiate between ruminants and non-ruminants (monogastric and hind gut fermentors); and the major organs.
	• Identify the general function of the cardiovascular system and the major organs.
	• Identify the general function of the endocrine and the major organs.
	• Identify the general function of the urinary system and the major organs.
	• Identify the general function of the reproductive system and both male and female organs.
	• Identify the general function of the nervous system and the major organs.
	• Identify the general function of the integumentary system and the major organs.

CTE Standards and Benchmarks	
	• Explain the differences in the teeth and eating habits for omnivores, carnivores, and herbivores.
16.0	Explain the various methods of animal identification. The student will be able to:
16.01	Explain types of identification tags and their use.
16.02	Explain the use of microchips for animal identification.
16.03	Explain types of tattoos for animals and the use in both companion and production animals.
16.04	Explain the types of ear tags and their use in production animals per USDA laws and regulations (premise ID).
16.05	Explain types of ear notching and use for identification.

Florida Department of Education
Student Performance Standards

Course Title: **Veterinary Assisting 3**
Course Number: **8111550**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas animal digestive systems; animal breeding; animal control; animal overpopulation; animal related laws; and breeds.

CTE Standards and Benchmarks	
17.0	Demonstrate knowledge of animal control and Human Society organizations. The student will be able to:
17.01	Differentiate between animal control agencies and Human Society organizations.
17.02	Describe the responsibilities and goals of animal control agencies and Human Society organizations.
17.03	Identify and locate local animal control agencies and Human Society organizations.
18.0	Describe the problems, causes, and solutions of animal overpopulation. The student will be able to:
18.01	Explain the cause and effect of overpopulation in animals.
18.02	Define euthanasia and describe its role in animal overpopulation.
18.03	Explain the pet owners' and societies' responsibilities concerning animal overpopulation.
18.04	Discuss the medical benefits of spaying and neutering.
19.0	Locate and interpret animal-related laws, in state statutes, or local ordinances. The student will be able to:
19.01	Describe local animal control laws.
19.02	Describe permitting requirements for exotic and wildlife animals.
19.03	Demonstrate knowledge of local and state animal regulations.
19.04	Determine the legal limitations of duties of an employee in the animal services industry.
19.05	Identify when an Animal Health Certificate is required.

CTE Standards and Benchmarks	
	19.06 Explain the laws governing the sale of animals.
	19.07 List the legal options for euthanasia as it varies with species.
	19.08 List the legal options for disposal of the animals body depending on the species.
	19.09 Discuss the importance of presenting the body of the pet in a respectful and empathetic way.
20.0	Identify the different digestive systems of animals and the nutritional requirements of selected species. The student will be able to:
	20.01 Describe the basic nutritional requirements of selected species.
	20.02 Analyze different feed labels and identify feed ingredients.
	20.03 Explain the appropriate storage for dry and canned dog or cat food.
	20.04 Explain nutritional needs based on life stage and size of animal and choose appropriate food and amount for specific animals for general care.
	20.05 Explain potential problems with feeding therapeutic foods incorrectly or to the wrong patient.
21.0	Explain the breeding practices of common companion and livestock animals. The student will be able to:
	21.01 Determine appropriate age or weight for breeding.
	21.02 Identify gestation length.
	21.03 Describe estrous cycle.
	21.04 Describe breeding techniques. (e.g., Natural, artificial insemination etc.)
	21.05 Identify selection criteria of males and females for reproduction.
	21.06 Describe care of breeding stock.
22.0	Investigate the common husbandry practices and daily care of companion animals, exotic animals, and fish. The student will be able to:
	22.01 Describe breeds, characteristics and husbandry and care of guinea pigs.
	22.02 Describe breeds, characteristics and husbandry and care of chinchillas.
	22.03 Describe breeds, characteristics and husbandry and care of ferrets.
	22.04 Describe breeds, characteristics and husbandry and care of amphibians.

CTE Standards and Benchmarks	
	22.05 Describe breeds, characteristics and husbandry and care of reptiles.
	22.06 Describe breeds, characteristics and husbandry and care of common fresh and salt water fish.
	22.07 Describe breeds, characteristics and husbandry and care of common avian species.
	22.08 Describe breeds, characteristics and husbandry and care of rabbits.
	22.09 Describe breeds, characteristics and husbandry and care of rodents.
23.0	Demonstrate knowledge of preventive medicine and disease control- the students will be able to:
	23.01 Describe the importance of preventive medicine for animal health.
	23.02 Differentiate between healthy and sick animals.
	23.03 Describe common infectious and noninfectious diseases of animals to include bacterial, viral, fungal, prion and zoonotic.
	23.04 Describe vaccinations available for disease prevention and vaccination procedures.
	23.05 Describe isolation or quarantine procedures for new or sick animals.
	• Describe methods of preventive medicine and quarantine for disease control in a kennel, cattery, paddock, rabbitry, and zoo.
	23.06 Discuss the terms immunology and active and passive immunity as it applies to disease and vaccination.
	23.07 Describe concepts for periodic health check-up.
	23.08 List and discuss common zoonotic diseases.
24.0	Demonstrate human-relations, communications, leadership, and employability skills. The student will be able to:
	24.01 Follow oral and written directions with understanding; ask questions that clarify directions as needed.
	24.02 Communicate effectively and professionally in verbal, written, and nonverbal modes; demonstrate effective telephone skills.
	24.03 Demonstrate acceptable employee hygiene habits.
	24.04 Complete pertinent forms for employment, such as a resume, a job application, a W-4 form.
	24.05 Demonstrate job interview techniques.
	24.06 Student avoids misrepresentation, slander, violating client confidentiality, substandard patient care, substance abuse, or animal abuse/neglect.

CTE Standards and Benchmarks	
24.07	Explain the veterinarian-client-patient relationships.
24.08	Explain the importance of keeping their credentials current with continuing education credits.
24.09	Conforms to safety and professional dress code by dressing in well- fitting scrubs or uniforms, closed- toed shoes, avoids excessive or loose jewelry, or excessive and visible body-piercings or tattoos, avoids long or fake nails, and keeps hair short or tied back.
24.10	Actively observe his/her working environment and animals, promptly reporting observations and concerns to the veterinary technician or veterinarian as needed.
24.11	Demonstrate initiative to complete tasks.
24.12	Discuss ways to resolve complaints or conflicts with either pet owners/clients or co-workers in a professional manner.

Florida Department of Education
Student Performance Standards

Course Title: **Veterinary Assisting 4**
Course Number: **8111520**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of animal welfare and rights; research; record keeping; disease and parasites.

CTE Standards and Benchmarks	
25.0	Differentiate between animal welfare and animal rights. The student will be able to:
25.01	Define animal welfare and animal rights.
25.02	Compare and contrast between animal welfare and animal rights.
25.03	Identify animal welfare and animal rights advocate groups.
25.04	Debate current events concerning animal welfare and animal rights.
25.05	Describe animal cruelty and the consequences of cruel treatment of animals.
26.0	Explain the role of animals in research. The student will be able to:
26.01	Describe the history of the role of animals in research.
26.02	Discuss medical advances made possible through the use of animals in research.
26.03	Define USDA and explain its roles in using animals for research.
26.04	Describe the role of the Institutional Animal Care and Use Committee (IACUC) with regard to animal research facilities.
26.05	Explain the controversy over using animals in research.
26.06	Identify organizations that are in favor of and those that are against the use of animals in research.
26.07	Develop a personal position on the use of animals in research and support that position.
26.08	Explain how biotechnology has affected animal research.

CTE Standards and Benchmarks	
	26.09 Debate the use of cloning for research purposes.
27.0	Maintain and analyze records. The student will be able to:
	27.01 Discuss the legal requirements of maintaining animal health records and maintain and analyze animal health records.
	27.02 Maintain and analyze basic business records (inventory, depreciation, receipts, expenses), using computer applications.
	27.03 Explain the process of scheduling appointments.
	27.04 Demonstrate admissions and discharges for boarders or non-medical cases.
	27.05 Demonstrate filing and retrieving of records from both numerical and alphabetical filing systems.
	27.06 Demonstrate computer and keyboarding skills.
	27.07 Demonstrate data collection from organized records.
	27.08 Discuss legal requirements of veterinary medical records to include: (1) establish veterinarian-client-patient relationship, (2) contain owner and patient information, (3) contain patient history, and (4) contain contemporaneously written medical procedures.
	27.09 Describe the duties of an office or hospital staff member as outlined by NAVTA which includes: • Greet pet owner/client, identifies his/herself by name and as veterinary assistant in a professional manner. • Obtain or confirm pet owner/client and pet information including pet owner/client's name, address, and phone numbers; pet's name, species, breed, color, sex and neutered/not neutered, and age or birth date. • Discuss process for recording new information and/or confirms existing information on medical record using appropriate medical terminology and concise notations. Include current date and reason for appointment. • Obtain and record the pet's vital signs (TPR, MM, & CRT) and weight with minimal restraint to the pet. • Leave the exam room courteously indicating the veterinarian will be right in.
	27.10 Explain the importance of client/patient confidentiality.
28.0	Explain proper sanitation for animal facilities. The students will be able to:
	28.01 Demonstrate proper sanitation techniques for an examination room, hospital facilities, surgical suites, kennel, cattery, paddock, rabbit hutch, and zoo.
	• Keep assigned work areas clean and organized.
	• Explain sanitary procedures including physical cleaning, disinfecting, and sterilizing.
	• Demonstrate proper cleaning protocols for kennels, runs, and enclosures including cleaning and disinfecting all sides of the kennel. (floor, ceiling, walls, and door) and all items in the kennel (bowls, blankets, toys, etc.)

CTE Standards and Benchmarks	
	• List precautions to take when mixing or using multiple cleaning and disinfecting agents i.e., NEVER mix bleach with ammonia containing cleaners or disinfectants.
	• Change bedding materials in a timely and efficient manner.
	• Demonstrate of the proper disposal of bedding and waste materials.
	• Notify supervisor of needed repair or maintenance on cages, kennels, or stalls.
29.0	Explain diagnostic testing and use of equipment. The student will be able to:
29.01	Explain the proper placement of a slide in the microscope and focus on 100X and 400X magnification.
29.02	Explain appropriate materials for cleaning the microscope.
29.03	Demonstrate the centrifugation of a sample.
29.04	Explain the purpose of the blood analyzer machine.
29.05	Explain a urinalysis including:
	• List methods for urine collection commonly used in the veterinary practice.
	• Collect a free-caught urine sample using proper techniques for dogs.
	• Identify time and storage parameters for urine samples.
	• List precautions and safety factors in handling urine samples including personal protection equipment.
29.06	Explain fecal test including:
	• Explain methods of collecting fecal samples.
	• Identify time and storage parameters for fecal samples.
	• Identify appropriate volume of feces for each method of testing.
	• Demonstrate the correct technique for handling and preparing the fecal samples for analysis by flotation, sedimentation, and direct smear.
	• Explain appropriate method of placing sample on microscope slide or cover slip.
	• List precautions and safety factors in handling fecal samples including personal protection equipment.

CTE Standards and Benchmarks	
	29.07 Examine radiology, electrocardiogram and ultrasound imaging techniques and safety.
	• Discuss restrictions from radiation exposure for pregnant women and minors.
	• Explain what a dosimeter badge does and who wears it and when.
	• Describe the area of exposure in the radiology room including direct beam and scatter radiation.
	• Explain the correct use of personal protection equipment including lead-shielded gowns, lead gloves, lead thyroid shield, lead glasses, and other lead protective wear.
	• Explain methods of restraint for positioning for radiographs including chemical restraint.
	• Explain the proper handling of radiographic film including safe light use.
	• Demonstrate the appropriate labeling of a radiograph including date, patient. name, view or side of patient, machine settings, and film developing
	• Maintain radiograph log and filing of films.
	• Explain how digital radiography differs from film.
30.0	Describe the process for handling a suspected rabies patient, and the process for other deceased animals. The student will be able to:
	30.01 *List the common species which may transmit rabies to humans.*
	30.02 *Explain the methods of transmission of rabies to animals and humans.*
	30.03 *List the symptoms associated with rabies.*
	30.04 *Explain the proper safety measures to follow when handling an animal suspected of having rabies.*
31.0	Describe internal and external parasites and control methods. The student will be able to:
	31.01 Set up fecal flotations or centrifuged fecal samples.
	31.02 Identify ectoparasites fleas, ticks, lice, and mites; explain the life cycle, treatment, and prevention methods.
	31.03 Identify ova of endoparasites roundworms, hookworms, whipworms, strongyles; explain the life cycle, treatment, and prevention methods
	31.04 Identify adult endoparasites roundworms, hookworms, whipworms, strongyles, and heartworms.
	31.05 Identify giardia and coccidia in fecal samples.

CTE Standards and Benchmarks
31.06 Identify tapeworm segments in fecal sample or an animal.

Florida Department of Education
Student Performance Standards

Course Title: **Veterinary Assisting 5**
Course Number: **8111530**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of grooming, effects of captivity of exotics; genetics and biotechnology in reproduction; diagnostic and therapeutic testing; surgical preparation; and pharmacology.

CTE Standards and Benchmarks	
32.0	Groom selected companion and livestock animals. The student will be able to:
32.01	*Discuss using a variety of brushes, combs, flea combs, mat splitters, undercoat rakes, etc. to groom animal hair/fur as needed for both cosmetic and therapeutic reasons.*
32.02	*Explain using clippers to cut animal hair/fur as needed for both cosmetic and therapeutic reasons.*
32.03	*Explain the necessity of following written and oral instructions and all label directions regarding shampoos for bathing and therapeutic or flea rinses (dips).*
32.04	*List precautions in bathing and dipping including avoiding soap or chemicals in the eyes, lathering the entire body, timing the shampoo application according to directions, and towel or blow drying.*
32.05	*Identify the area of blood and nerve supply of the nail in the dog and cat and common pets such as rabbits and ferrets.*
32.06	*Identify appropriate instrument or nail trimmer for small and large dogs and cats.*
32.07	*Demonstrate comfortable handling of paw or limb during nail trim for dog and cat.*
32.08	*Explain methods for hemostasis if nail is accidentally trimmed too short.*
32.09	*Notify supervisor of abnormalities including in-grown nails and abnormal growth or shape.*
32.10	Describe the steps in expressing anal sacs using the external method.
32.11	Discuss proper hoof care and hoof trimming needs.
33.0	Describe exotic animals and the effects of captivity on them. The student will be able to:
33.01	Define exotic animal, zoo animal, invasive and native animals.

CTE Standards and Benchmarks	
33.02	Identify exotic animals native and invasive to Florida.
33.03	Explain the effects of urban sprawl on the wildlife population.
33.04	Describe the roles of the Florida Fish and Wildlife Conservation Commission in wildlife management.
33.05	Explain state, national, and international laws affecting the purchase and transport of exotic animals.
34.0	Assess techniques used in surgical assisting and surgical preparation. The student will be able to:
34.01	*Prepare and sterilize surgical equipment and supplies.* • *Explain standard procedure for cleaning and lubricating all stainless steel instruments.* • *Explain appropriate use of ultrasonic instrument cleaning and proper solutions.* • *Explain cold sterilization trays and appropriate solutions.* • *Demonstrate assembly and wrapping of surgical packs for sterilization.* • *Demonstrate folding and wrapping a surgical gown for sterilization.* • *Explain proper procedure for sterilizations methods including the autoclave and gas sterilization (ethylene oxide) including safety precautions with each.*
34.02	*Describe components of surgical assisting.* • *Explain aseptic protocol for maintaining sterility of the surgical field.* • *Demonstrate what can and cannot be touched when assisting in a surgical environment.* • *Demonstrate how suture material might be removed from its outer packaging and passed to the surgeon while maintaining sterility.*
34.03	*Summarize procedures necessary of patient preparation.* • *Explain reason for pre-surgical fasting and appropriate time interval.* • *List methods to identify animal for surgery and confirm identity.* • *Demonstrate dorsal and sternal recumbancy positioning and securing animal in each on the surgery table under anesthesia as instructed by the veterinary technician or veterinarian.* • *Demonstrate clipping or shaving surgical field as instructed by the veterinary technician or veterinarian.* • *Demonstrate cleaning and disinfecting the surgical field using currently accepted standards for aseptic technique and surgical scrub.*
34.04	*Identify proper post-surgical care techniques.* • *List parameters to monitor during recovery and signs of distress in the recovery period.* • *Explain the swallow reflex and the appropriate time and method for endotracheal tube removal.* • *Explain appropriate transfer of animal from surgery to recovery kennel, positioning in kennel, and precautions in kennel.* • *Confirm “No food or water” or similar instructions on recovery kennel.*

CTE Standards and Benchmarks	
35.0	Explain principles of pharmacology. The student will be able to:
	35.01 Identify forms of medication including tablet, capsule, liquid, powder, granules, topical creams, liquids, and gels.
	35.02 Explain the application of topical flea medication.
	35.03 Demonstrate the reconstitution of vaccine using appropriate diluents and amounts of diluents.
	35.04 List the components that must be present on a prescription label.
	35.05 Observe and understand controlled substances logs and security.
	35.06 Inventory pharmacy supplies and notify supervisor of low supplies.
	35.07 Identify expiration date on labels and notify supervisor of expired drugs.
	35.08 Maintain clean shelves and storage areas for pharmaceuticals.
	35.09 Describe the process for administering medications by injection, oral, nasal, and topical on companion and livestock animals.
	35.10 Describe the procedure for safe disposal of medications.
	35.11 Determine methods to observe animals for medicine side effects or allergies.
36.0	Explain proper methods of syringe and hypodermic needle use. The student will be able to:
	36.01 Identify the appropriate gauge hypodermic needle per species and task (12 g, 18 g, 20 g, 22 g, 25 g, etc).
	36.02 Identify the appropriate volume syringe for the task (3cc, 6cc, 12cc, 20cc, 35cc, 60cc, 1cc tuberculin or insulin syringe, etc).
	36.03 Demonstrate the ability to read the precise volume of medication in a syringe and to fill a syringe with medication to a specified volume when requested.
	36.04 Describe appropriate SQ, IM, and IV injection sites.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org.

Special Notes

Benchmarks that appear in italics within the framework are skills or competencies that have been taken directly from the Skills Competency Validation list. Contact the Florida Veterinary Medical Association for the most up to date skills list.

Because of the production and marketing cycle of the animal industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Agricultural Sales and Services**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8116000
CIP Number	0101010500
Grade Level	9-12
Program Length	3 credits
Teacher Certification	Refer to the **Program Structure** section
CTSO	FFA
SOC Codes (all applicable)	41-4011 -- Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ
8116010	Agricultural Sales and Services 2	AGRICULTUR 1 @2	1 credit	41-4011	3	EC
8116020	Agricultural Sales and Services 3		1 credit	41-4011	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Agricultural Sales and Services 2

09.0 Explain the components of the American business system.
10.0 Identify the basic concepts of agribusiness.
11.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
12.0 Students examine the scope of career opportunities and the importance of agriculture to the economy.
13.0 Perform accounting activities.
14.0 Conduct appropriate market and marketing research.
15.0 Develop a marketing plan.
16.0 Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.
17.0 Develop specific tactics to market AFNR products and services.
18.0 Observe local, state, and federal rules and regulations.
19.0 Develop financial literacy skills.

Agricultural Sales and Services 3

20.0 Describe the ways American business is organized (e.g., sole proprietorship, partnership, corporation, LLC, cooperation).
21.0 Investigate agricultural cooperatives structure and function.
22.0 Summarize methods of selling agricultural products and services.
23.0 Merchandise products and services to achieve specific marketing goals.
24.0 Model effective sales principles and techniques.
25.0 Perform promotional activities.
26.0 Demonstrate employability skills.
27.0 Demonstrate acceptable customer-relations skills.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Sales and Services 2**
Course Number: **8116010**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the basic concepts of agribusiness; the operation and maintenance of equipment and maintenance of facilities; handling merchandise; demonstration of positive customer-relations and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Explain the components of the American business system. The student will be able to:	
09.01	Compare different forms of business organizations.	
09.02	Distinguish and identify between the characteristics of each type of market structures (monopoly, oligopoly, monopolistic competition, pure competition).	
09.03	Research the factors that contribute to the four phases of the business cycle (peak, contraction – unemployment, trough, expansion – inflation).	
10.0	Identify the basic concepts of agribusiness. The student will be able to:	
10.01	Explain the following concepts: • business cycle • profit/loss • competition • supply/ demand • quantity supplied – graphically illustrate situations that would cause change. • quantity demanded – graphically illustrate situations that would cause change. • equilibrium price	
10.02	Identify and discuss ethical issues in agribusiness.	
10.03	Identify the different roles in agriculture sales careers.	
11.0	Students evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:	
11.01	Assess the agricultural impact upon the on US gross national product and the total global economy.	
11.02	Discuss the impact global trade has US agribusiness industries, including barriers and regulations.	

CTE Standards and Benchmarks		National Standards
	11.03 Identify and describe the primary government agencies involved with agriculture.	
	11.04 Recognize new and emerging technologies and their impact on the economy.	
	11.05 Recognize the value of the food and agribusiness industry.	
12.0	Students examine the scope of career opportunities and the importance of agriculture to the economy. The student will be able to:	
	12.01 Explore agriculture and agribusinesses and their role in the economy.	
	12.02 Evaluate the agribusiness career opportunities in agriculture.	
	12.03 Calculate the total educational cost of an agricultural career.	
	12.04 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.	
	12.05 Demonstrate those qualities, attributes, and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.	
	12.06 Analyze how changes in the market and changes in product quality can affect wages, and employment status.	
	12.07 Construct a one year budget plan for a specific career path including major items and expenses.	
13.0	Perform accounting activities. The student will be able to:	
	13.01 Interpret financial statements.	
	13.02 Create and interpret a budget for one year.	
	13.03 Establish a plan to pay off debt.	
	13.04 Explain cash management strategies including debit accounts, checking accounts, and savings accounts.	
	13.05 Analyze credit scores and reports and their uses.	
	13.06 Complete a profit and loss statement.	
	13.07 Calculate the finance charges and total amount due on a credit card bill; include any fees that could be included.	
	13.08 Examine inflation, its effects on interest, value of goods and services, and employment.	
	13.09 Analyze consequences for not repaying a loan or having missing/late payments on loans or credit cards.	

CTE Standards and Benchmarks		National Standards
13.10	Compare different tax models at the federal, state, and local level.	
13.11	Explain regulations or laws that are put in place to regulate financial institutions and protect business or consumers.	
14.0	Conduct appropriate market and marketing research. The student will be able to:	
14.01	Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products, and services and to agricultural goods in domestic and international markets.	ABS.06.01.01.a
14.02	Apply benefit/cost analysis to marketing in AFNR businesses.	ABS.06.01.01.b
14.03	Implement and evaluate marketing strategies with agricultural commodities, products, and services.	ABS.06.01.01.c
14.04	Describe functions in agricultural marketing.	ABS.06.01.02.a
14.05	Assess the presence of marketing infrastructure for agricultural commodities.	ABS.06.01.02.b
14.06	Evaluate alternative marketing strategies, such as value adding, branding and niche marketing, and propose and implement appropriate modifications to achieve AFNR business goals.	ABS.06.01.02.c
14.07	Explain how buyer and sellers actions can determine the rate of return on an investment.	
14.08	Prepare a flowchart that shows production processes, including the resources and capital needed for each step.	
15.0	Develop a marketing plan. The student will be able to:	
15.01	Identify the purpose, components, and developmental processes of marketing plans.	ABS.06.02.01.a
15.02	Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources.	ABS.06.02.01.b
15.03	Establish marketing plan goals/objectives, including monitoring, measuring, and analyzing goal achievement.	ABS.06.02.01.c
16.0	Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management. The student will be able to:	
16.01	Identify financial concepts associated with production and profit (traditional, market, command, mixed) in how they answer the questions 1) what to produce, 2) how to produce, 3) for whom to produce.	ABS.04.01.02.a
16.02	Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital such as savings and investment services.	ABS.04.01.02.c
16.03	Name and explain the impact of external economic factors on an AFNR business such as inflation.	ABS.05.01.02.a
16.04	Predict the consequences of delayed payment of expenses, prepayment of expenses and delayed receipts on a financial statement.	ABS.05.01.02.c

CTE Standards and Benchmarks		National Standards
17.0	Develop specific tactics to market AFNR products and services. The student will be able to:	
17.01	Explain the meaning and use of the four Ps (product, price, place, and promotion) in marketing.	ABS.06.04.01.a
17.02	Develop advertising campaigns that promote products and services.	ABS.06.04.01.b
17.03	Implement sales goals and incentive programs and identify pricing strategies used by competitors.	ABS.06.04.01.c
17.04	Explain how to determine prices and output though marginal cost analysis.	
17.05	Explain and differentiate variable and fixed costs.	
17.06	Compose a formula to determine the value of your product or service.	
18.0	Observe local, state, and federal rules and regulations. The student will be able to:	
18.01	List agencies responsible for inspecting and regulating operation or product.	
18.02	List reasons for the necessity of inspections, certification, and regulations.	
18.03	Explain the problems that occur when government institutes wage and price controls, and explain the rational for these controls	
18.04	Identify technical assistance available from private and government sources. (e.g., Extension, FDACS, FDA, IFAS)	
19.0	Develop financial literacy skills. The student will be able to:	
19.01	Explain the different types of record-keeping systems used in agribusiness.	
19.02	Analyze types of loans, including the importance of down payments, and collateral on securing funding sources.	
19.03	Calculate the effects on the monthly payment in the change of interest rate based on an adjustable rate mortgage.	
19.04	Analyze diversification in investments.	
19.05	Explain the risk benefit in investment areas.	
19.06	Analyze stock with a set amount of money, and follow the process through gains, losses, and selling.	
19.07	Compare and contrast income from purchase of common stock, preferred stock, and bonds.	
19.08	Given current exchange rates be able to convert from one form of currency to another.	

CTE Standards and Benchmarks		National Standards
19.09	Compare different insurance options and fees.	
19.10	Compare and contrast the role of insurance as a device to mitigate risk and calculate expenses of various options.	
19.11	Collect, organize, and interpret data to determine an effective retirement savings plan to meet personal financial goals.	
19.12	Discuss when bankruptcy should be used as an action and the repercussions involved with filing.	
19.13	Recognize how identity theft can occur, ways to protect yourself, and available assistance for victims.	

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Sales and Services 3**
Course Number: **8116020**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the general principles of agribusiness; performing agricultural business activities; merchandising and selling agricultural products and services; performing promotional activities and local, state, and federal rules and regulations.

CTE Standards and Benchmarks		National Standards
20.0	Describe the ways American business is organized (e.g., sole proprietorship, partnership, corporation, LLC, cooperation). The student will be able to:	
20.01	Distinguish and identify between the characteristics of each method of doing business.	
20.02	Evaluate the advantages and disadvantages provided by each business method.	
20.03	Determine the tax structure applicable to different agribusinesses.	
21.0	Investigate agricultural cooperatives structure and function. The student will be able to:	
21.01	Explain the definition of a cooperative.	
21.02	Understand the history of cooperative principles and practices and how they differ from other businesses.	
21.03	Distinguish and identify between the types of cooperative structure and their functions.	
21.04	Explain the single-tax principle and how it works for cooperatives and differentiate between direct and indirect taxes and describe the progressivity of taxes.	
22.0	Summarize methods of selling agricultural products and services. The student will be able to:	
22.01	Analyze marketing and pricing alternatives.	
22.02	Differentiate marketing, pricing, value, and grading standards for different agricultural products.	
22.03	Promote agricultural products.	
22.04	Explain the purpose, benefit, and quality of the products sold.	
22.05	Determine customer needs and wants.	

CTE Standards and Benchmarks		National Standards
22.06	Recommend products and services that meet the customer's needs or wants.	
22.07	Demonstrate effective sales principles and techniques.	
22.08	Process customer orders by various means, including electronic communications.	
22.09	Follow up to ensure the quality assurance and customer satisfaction.	
22.10	Provide technical assistance to customers.	
22.11	Respond to customer complaints.	
23.0	Merchandise products and services to achieve specific marketing goals. The student will be able to:	
23.01	Identify, explain, and organize components of the sales process.	ABS.06.05.01.a
23.02	Prepare for a customer call or visit.	
23.03	Develop effective customer relationships using approaches that are consistent and comprehensive.	ABS.06.05.01.b
23.04	Revise marketing strategies based on monitoring and measurement information for target customer base.	ABS.06.05.01.c
23.05	Develop strategies to gain new customers.	ABS.06.05.02.a
23.06	Devise sales practices to achieve goals effectively and efficiently.	ABS.06.05.05.b
23.07	Prepare and make sales presentations.	ABS.06.05.02.c
23.08	Identify and maintain needed sales records.	ABS.06.05.03.a
23.09	Use strategies to follow up sales to provide post-sales service.	ABS.06.05.03.b
23.10	Intercept, interpret and resolve customer complaints, needs and problems with products and services.	ABS.06.05.03.c
24.0	Model effective sales principles and techniques. The student will be able to:	
24.01	Describe the process of creating an opening.	
24.02	Prepare strategies for handling objections.	
24.03	Compare different methods for highlighting selling points.	
24.04	Create versions of closing strategies.	

CTE Standards and Benchmarks		National Standards
25.0	Perform promotional activities. The student will be able to:	
25.01	Identify potential customers.	
25.02	Collect and analyze market information.	
25.03	Develop a plan for advertising an agricultural product or service (e.g., social media, print, television, radio).	
25.04	Identify appropriate trade shows and demonstrations.	
25.05	Present an oral presentation in a promotional meeting, utilizing visual aids.	
26.0	Demonstrate employability skills. The student will be able to:	
26.01	Conduct a job search and identify advanced-training opportunities and requirements.	
26.02	Compile the components of an employer's investment. (e.g., products, employees, equipment)	
26.03	Obtain information about a job, including employee benefits, career advancement, job satisfaction, employee benefits, etc.	
26.04	Prepare a resume.	
26.05	Demonstrate ethical and responsible practices.	
26.06	Evaluate the importance of pride in the quality of workmanship.	
26.07	Describe the advantages of a good driving record and the ramifications of a poor driving record on employability opportunities.	
26.08	Reinforce the importance of confidentially in various workplace situations. (ex., product launch, customer information, personal social media use, non-disclosure agreements)	
26.09	Demonstrate appropriate responses to performance evaluations from the employer, the supervisor, and other persons in the workplace.	
26.10	Identify usual employee benefits and wages in AFNR businesses.	ABS.02.04.02.a
27.0	Demonstrate acceptable customer-relations skills. The student will be able to:	
27.01	Explain the purpose of a customer relationship system.	
27.02	Evaluate the importance of self-control in customer-relations.	
27.03	Identify and demonstrate appropriate responses to criticism and praise.	

CTE Standards and Benchmarks	National Standards
27.04 Explain the effects of positive human relations on success in business.	
27.05 Demonstrate respect for the customer's desires and property.	
27.06 Practice effective communication skills to enhance customer relations (e.g., phone, email, social media).	

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Agricultural Communications**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8117000
CIP Number	0101080200
Grade Level	9-12
Program Length	3 credits
Teacher Certification	Refer to the **Program Structure** Section
CTSO	FFA
SOC Codes (all applicable)	27-3099 -- Media and Communication Workers, All Other
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in instruction in animal and plant production and processing; agriculture marketing and communications; employability skills; mathematics; basic science; biological sciences; and human-relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations1	AGRICULTURE 7 G AGRICULTUR 1 @2	1 credit		3	EQ
8117010	Agricultural Communications 2	AGRICULTUR 1 @2	1 credit	27-3099	3	CT
8117020	Agricultural Communications 3		1 credit	27-3099	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Agricultural Communications 2

09.0 Investigate the communications sector of the agricultural industry.
10.0 Identify the forms of communication.
11.0 Develop communication messages.
12.0 Demonstrate oral communications skills.
13.0 Conduct interviews.
14.0 Utilize printed agricultural media.
15.0 Utilize photography and graphics.
16.0 Develop, design and edit publications and documents.
17.0 Develop audio and video media.
18.0 Investigate ethical and professional issues in agricultural communications.
19.0 Demonstrate leadership, employability, and human relations skills.
20.0 Students evaluate the importance of the food and fiber system to understand the impact on global economy.
21.0 Students examine the scope of career opportunities in and the importance of agriculture to the economy.

Agricultural Communications 3

22.0 Explore the communications sector of the agricultural industry.
23.0 Create communication messages.
24.0 Demonstrate oral communications skills.
25.0 Generate printed agricultural media.
26.0 Modify photography and graphics.
27.0 Create, design and edit publications and documents.
28.0 Create or analyze audio and video media.
29.0 Investigate ethical and professional issues in agricultural communications.
30.0 Demonstrate leadership, employability, and human relations skills.
31.0 Use online social media.

32.0 Create an agricultural communications campaign.
33.0 Explain the components of the American business system.
34.0 Investigate agricultural cooperatives structure and function.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Communications 2**
Course Number: **8117010**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the communications sector of the agricultural industry including instruction in developing and editing materials for printed media and media broadcast, utilizing photography and graphics, the importance of the internet in communications, writing technical papers and media scripts and ethical and professional issues in the industry.

CTE Standards and Benchmarks	
09.0	Investigate the communications sector of the agricultural industry. The student will be able to:
09.01	Describe the importance of and how communication is used in American agriculture and society.
09.02	Discuss career opportunities in agricultural communications including the educational requirements.
09.03	Identify professional organizations related to agricultural communications.
10.0	Identify the forms of communication. The student will be able to:
10.01	Explain the different types of communication: verbal, non-verbal, written and visual.
10.02	Compare the various forms of communication technologies: print, video, online media, visual arts and social media.
10.03	Identify communication barriers and determine methods of overcoming these barriers.
11.0	Develop communication messages. The student will be able to:
11.01	Conduct an audience analysis.
11.02	Research information for message development.
11.03	Analyze credibility of research and sources.
11.04	Utilize elements of informative and persuasive messages.
11.05	Compare and contrast media channels.

CTE Standards and Benchmarks	
	11.06 Identify agricultural messages in the media.
	11.07 Create informative and persuasive messages using various communication methods.
12.0	Demonstrate oral communications skills. The student will be able to:
	12.01 Determine types of speeches: informative, persuasive.
	12.02 Identify the importance of public speaking skills in career development.
	12.03 Explain the characteristics of an effective public speaker.
	12.04 Explain the steps necessary to prepare a speech.
	12.05 Present a prepared speech.
	12.06 Present an extemporaneous speech.
	12.07 Create visual aids for presentations.
13.0	Conduct interviews. The student will be able to:
	13.01 Research information for an interview (including company or organization information and information about the interviewee to build rapport).
	13.02 Identify the types of interview questions.
	13.03 Write interview questions.
	13.04 Conduct an interview.
	13.05 Conduct follow-up procedures.
14.0	Prepare written agricultural media. The student will be able to:
	14.01 Explain the evolution and relevance of printed media in the agricultural industry. Describe the components of various styles in written articles.
	14.02 Identify and list the criteria for newsworthiness of a news story.
	14.03 Explain the structure of the inverted pyramid.
	14.04 List the five W's and the H: who, what, when, where, why and how.

CTE Standards and Benchmarks	
	14.05 Compose a news story and news release on an agricultural topic.
	14.06 Compose a news release on an agricultural topic.
	14.07 Use the *Associated Press Stylebook and Libel Manual* to edit articles.
	14.08 Define the components of an editorial.
15.0	Utilize photography and graphics. The student will be able to:
	15.01 Identify types of photographs and graphics.
	15.02 Describe the importance of photographs and graphics to agriculture communications.
	15.03 Identify key terms in digital photography and photo editing.
	15.04 Compose a quality photograph.
	15.05 Demonstrate the use of technology, software, and hardware used in photography and graphic design.
	15.06 Explain the difference among digital file formats. .
16.0	Develop, design and edit publications and documents. The student will be able to:
	16.01 Identify key terms in publication and document design.
	16.02 Explain and apply the components of the publication and document development process.
	16.03 Identify common mistakes in publication and document design.
	16.04 Use the appropriate software to design a publication and document.
17.0	Develop audio and video media. The student will be able to:
	17.01 Explain and implement the electronic media production process.
	17.02 Write video and audio scripts.
	17.03 Describe the importance of grammar and punctuation in writing scripts.
	17.04 Draw a video storyboard.
	17.05 Write a video shot outline.

CTE Standards and Benchmarks	
	17.06 Identify a proper video shot sequence (long shot, medium shot, close-up).
	17.07 Create a promotional video.
	17.08 Demonstrate proper tone and voice inflection for radio and video.
	17.09 Produce a video message with no narration.
18.0	Investigate ethical and professional issues in agricultural communications. The student will be able to:
	18.01 Demonstrate characteristics of responsible/ethical media professionals: public relations professional, reporter and editor.
	18.02 Adhere to all media deadlines.
	18.03 Describe plagiarism, libel, slander, copyright and intellectual property.
19.0	Demonstrate leadership, employability, and human relations skills. The student will be able to:
	19.01 Conduct a job search for a career in agricultural communications.
	19.02 Develop a resume and an application letter. Identify documents that may be required when applying for a job in the agricultural communication field.
	19.03 Identify and demonstrate proper human relation skills.
	19.04 Complete a job application form.
	19.05 Write a proper thank you letter.
	19.06 Identify proper workplace and interview attire.
	19.07 Create business letters.
	19.08 Create electronic correspondence.
20.0	Students evaluate the importance of the food and fiber system to understand the impact on global economy. The student will be able to:
	20.01 Assess the agricultural impact upon the US gross national product and the total global economy.
	20.02 Investigate local, state, and national regulatory laws, industry regulations, and legislation for agricultural businesses.
	20.03 Identify and describe the primary government agencies involved with agriculture.
	20.04 Research new and emerging technologies and their impact on the economy.

CTE Standards and Benchmarks	
	20.05 Recognize the value of the food and agribusiness industry.
21.0	Students examine the scope of career opportunities in and the importance of agriculture to the economy. The student will be able to:
	21.01 Define and explore agriculture and agribusinesses and their role in the economy.
	21.02 Evaluate and explore the agribusiness career opportunities in agriculture.
	21.03 Compare how key organizational structures and processes affect organizational performance and the quality of products and services.
	21.04 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.

Florida Department of Education
Student Performance Standards

Course Title: **Agricultural Communications 3**
Course Number: **8117020**
Course Credit: **1**

CTE Standards and Benchmarks	
22.0	Explore the communications sector of the agricultural industry. The student will be able to:
22.01	Identify influential, historical, and current issues in the agricultural industry that necessitates agricultural communication.
22.02	Objectively debate agricultural issues.
23.0	Create communication messages. The student will be able to:
23.01	Define what persuasion is and explain how it can be used to influence others.
23.02	Describe and provide an example of how persuasion is used in the media.
23.03	Create persuasive media.
23.04	Identify different types of communication research methods.
24.0	Demonstrate oral communications skills. The student will be able to:
24.01	Identify various forms of visual aids for an oral presentation.
24.02	Present a speech using visual aids and non-verbal cues.
24.03	Evaluate a speech.
25.0	Generate printed agricultural media. The student will be able to:
25.01	Develop a media kit consisting of a backgrounder, fact sheet, news release and other media.
25.02	Compose an advance story, feature story, follow-up story, cover story and news release on an agricultural topic.
26.0	Modify photography and graphics. The student will be able to:
26.01	Crop and edit photographs and graphics to enhance an article or news release.
26.02	Write effective captions/cutlines for photographs and graphics.

CTE Standards and Benchmarks	
27.0	Create, design and edit publications and documents. The student will be able to:
	27.01 Create a magazine layout, brochure, poster, newsletter, and/or display for an agriculture product or event.
28.0	Create or analyze audio and video media. The student will be able to:
	28.01 Create or analyze an informational video.
	28.02 Create or analyze a persuasive video.
	28.03 Create or analyze an audio program or podcast.
29.0	Investigate ethical and professional issues in agricultural communications. The student will be able to:
	29.01 Define key terms related to ethics and professionalism and discuss their relationship to agriculture.
	29.02 Describe the importance of confidentiality in agricultural communications.
	29.03 Respond appropriately to opposing views in a professional manner.
	29.04 Identify concepts of risk communication and crisis communication.
30.0	Demonstrate leadership, employability, and human relations skills. The student will be able to:
	30.01 Demonstrate competence in job interview techniques
	30.02 Identify or demonstrate appropriate responses to criticism.
	30.03 Answer interview questions competently.
	30.04 Participate in mock interviews.
	30.05 Analyze one's own online presence.
31.0	Use online and social media. The student will be able to:
	31.01 Compare and contrast the methods of delivering a message through different types of online and social media.
	31.02 Analyze online and social media for credibility and relevance.
	31.03 Research the agricultural industry’s use of online and social media.
	31.04 Compose a professional e-mail.

CTE Standards and Benchmarks	
	31.05 Demonstrate an understanding of web design software and language.
	31.06 Create or analyze an agricultural website.
	31.07 Use proper composition principles to capture images with mobile technology.
	31.08 Access data or information utilizing a mobile app.
32.0	Create an agricultural communications campaign. The student will be able to:
	32.01 Define key terms in communications campaign development.
	32.02 Identify and perform the various professional roles in a communications campaign.
	32.03 Identify the strengths and weaknesses of various media for use in communication campaigns.
	32.04 Develop a communications campaign.
	32.05 Develop a research report for the agricultural industry using an industry standard format.
33.0	Explain the components of the American business system. The student will be able to:
	33.01 Describe the five basic ways American business is organized.
	33.02 Distinguish and identify between the characteristics of each method of doing business.
	33.03 Evaluate the advantages and disadvantages provided by each business method.
	33.04 Evaluate how cooperative principles and practices differentiate cooperatives from other businesses.
34.0	Investigate agricultural cooperatives structure and function. The student will be able to:
	34.01 Explain the definition of a cooperative.
	34.02 Understand the history of cooperative principles and practices.
	34.03 Describe the five areas that classify cooperative structure.
	34.04 Distinguish and identify between the five types of cooperative structure and their functions.
	34.05 Demonstrate the need for internal and external communications in a cooperative.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Forestry**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8118300
CIP Number	0103050101
Grade Level	9-12
Program Length	4 credits
Teacher Certification	Refer to the **Program Structure** section
CTSO	FFA
SOC Codes (all applicable)	45-4011 -- Forest and Conservation Workers 19-4093 -- Forest and Conservation Technicians
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the forestry industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety, and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTURE 7 G AGRICULTUR 1 @2	I		3	EQ
8118310	Forestry and Natural Resources 2	AGRICULTUR 1 @2	1 credit	45-4011	2	CT
8118320	Forestry and Natural Resources 3		1 credit	45-4011	2	CT
8118330	Forestry 4		1 credit	19-4093	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Forestry and Natural Resources 2

09.0 Practice forestry and natural resources safety.
10.0 Operate, maintain, and repair machinery, equipment, and facilities.
11.0 Monitor water resources.
12.0 Collect and test soil samples.
13.0 Apply multi-use principles to forests and other lands.
14.0 Perform basic surveying operations.
15.0 Read and interpret aerial photographs and maps.
16.0 Analyze and interpret soil survey data.
17.0 Perform basic nursery operation activities.
18.0 Apply basic financial management skills.
19.0 Demonstrate leadership and employability skills.
20.0 Monitor air quality.
21.0 Describe timber marketing procedures and techniques.
22.0 Measure trees and forest volume.
23.0 Perform preventive maintenance, checks, and services for forestry equipment.

Forestry and Natural Resources 3

24.0 Apply forestry and natural resources safety.
25.0 Operate, maintain, and repair machinery, equipment, and facilities according to forestry industry standards.
26.0 Identify the major ecosystems in Florida.
27.0 Perform monitoring of water resources.
28.0 Assist in controlling and using fire in forests and other lands.
29.0 Assist in managing forest pests.
30.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
31.0 Apply multi-use principles to forest and other lands.

32.0 Use aerial photographs and maps.
33.0 Collect and test water samples.
34.0 Interpret soil survey data.
35.0 Apply the principles of Best Management Practices (BMP).
36.0 Identify technological advances in the industry.
37.0 Identify wildlife population management practices.
38.0 Identify multi-use principles for forest and other lands.
39.0 Apply basic financial management skills.
40.0 Demonstrate leadership and management skills.

Forestry 4

41.0 Apply the principles of basic nursery operations.
42.0 Assist in managing the urban forest.
43.0 Apply business management skills and identify appropriate legal documents.
44.0 Explain the basic silvicultural systems used in forest management.
45.0 Prescribe burning for forest management.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Forestry and Natural Resources 2**
Course Number: **8118310**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of career opportunities; safety; operation, maintenance and repair of machinery, equipment and facilities; soil testing, surveying; water resources; and financial management skills.

CTE Standards and Benchmarks	
09.0	Describe the forestry and natural resources industry. The student will be able to:
09.01	Identify career and educational opportunities in the forestry and natural resources industries.
09.02	Describe the importance of forestry and natural resources.
09.03	Identify professional and interest organizations and trade journals in the forestry and natural resources industries.
10.0	Practice forestry and natural resources safety. The student will be able to:
10.01	Identify and eliminate hazards of the workplace.
10.02	Observe color-coded warnings in work areas and on equipment and machinery.
10.03	Demonstrate safety procedures and workplace "housekeeping" practices.
10.04	Identify safe and effective fire extinguishing techniques.
10.05	Apply minor first aid treatment and identify emergency procedures.
10.06	Safely handle and store flammable and non-restricted chemicals.
10.07	Select personal safety equipment and appropriate clothing.
10.08	Operate machinery and equipment according to the safety recommendations of the manufacturers.
11.0	Operate, maintain, and repair machinery, equipment, and facilities. The student will be able to:
11.01	Use the equipment operator parts, and repair manuals.

CTE Standards and Benchmarks	
	11.02 Service and maintain small gasoline engines.
	11.03 Operate, service, and maintain tractors and equipment.
	11.04 Dispose of waste products according to required procedures.
	11.05 Use shop and lab instruments and equipment.
	11.06 Perform minor welding repairs using arc and oxy-acetylene equipment.
12.0	Monitor water resources. The student will be able to:
	12.01 Identify important physical and chemical properties of water.
	12.02 Identify present and potential sources of water pollution.
13.0	Collect and test soil samples. The student will be able to:
	13.01 Identify important physical and chemical properties of soil.
	13.02 Collect soil samples representative of an area, complete soil data forms, and submit them for laboratory analysis.
	13.03 Test soil for acidity or alkalinity and recommend proper soil additives to correct the pH level.
	13.04 Determine the appropriate conservation management practices for planting a particular area.
	13.05 Determine land classes according to soil classification standards.
14.0	Apply multi-use principles to forests and other lands. The student will be able to:
	14.01 Identify the types of land ownership.
15.0	Perform basic surveying operations and map reading operations. The student will be able to:
	15.01 Using linear measurements, calculate the area of a tract of land.
	15.02 Interpret legal land descriptions.
	15.03 Locate a land area, using a legal land description.
	15.04 Review and interpret aerial maps/photos.
	15.05 Explain topographic map symbols and legends.

CTE Standards and Benchmarks	
	15.06 Interpret topographic map.
	15.07 Measure acreage on maps.
16.0	Read and interpret aerial photographs and maps. The student will be able to:
	16.01 Interpret the terms, symbols, and scales used on soil and topographic maps.
17.0	Analyze and interpret soil survey data. The student will be able to:
	17.01 Locate a designated site in the soil survey.
	17.02 Analyze and interpret soil survey data.
18.0	Perform basic nursery operation activities. The student will be able to:
	18.01 Identify methods of propagation.
	18.02 Perform basic nursery operation activities, such as pruning, trimming, and fertilizing.
	18.03 Maintain plants.
19.0	Apply basic financial management skills. The student will be able to:
	19.01 Complete basic financial records.
	19.02 Demonstrate the use of banking procedures.
20.0	Demonstrate leadership and employability skills. The student will be able to:
	20.01 Identify documents that may be required for a job application.
	20.02 Complete a job application form.
	20.03 Demonstrate competencies in job-interview techniques.
21.0	Monitor air quality. The student will be able to:
	21.01 Identify important physical and chemical properties of air.
	21.02 Identify present and potential sources of air pollution.
	21.03 Analyze and interpret lab results.

CTE Standards and Benchmarks	
22.0	Describe timber marketing procedures and techniques. The student will be able to:
22.01	Identify the products made from trees and other natural resources and their value.
22.02	Select and mark trees to be removed in timber stand improvement.
22.03	Conduct a simple cruise.
22.04	Calculate the volume and value of timber.
22.05	Identify the components of timber sales contracts.
22.06	Identify the methods of harvesting and erosion prevention.
22.07	Identify and describe the use of tree measuring tools and instruments, such as dendrometers, hypsometers, increment borers, prisms, volume tables, and logger's tape.
23.0	Perform preventive maintenance, checks, and services for forestry equipment. The student will be able to:
23.01	Perform daily operator maintenance checks for equipment.
23.02	Determine the preventive maintenance procedures, using the equipment operator manuals.
23.03	Perform scheduled preventive maintenance procedures.
23.04	Interpret and perform operator's troubleshooting procedures as described in the operator's manual.
23.05	Keep records of the maintenance and servicing of equipment.

Florida Department of Education
Student Performance Standards

Course Title: **Forestry and Natural Resources 3**
Course Number: **8118320**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of safety; operation, maintenance, and repair of machinery, equipment and facilities; ecosystems; water resources; wildlife populations; fire use and control; pest management; analyzing and interpreting data.

CTE Standards and Benchmarks	
24.0	Apply forestry and natural resources safety. The student will be able to:
24.01	Comply with Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) safety rules and regulations.
24.02	Describe Florida's "Right-to-Know" law (as recorded in the Florida Statutes, Chapter 442).
25.0	Operate, maintain, and repair machinery, equipment, and facilities according to forestry industry standards. The student will be able to:
25.01	Prepare equipment for storage.
25.02	Maintain and repair facilities.
26.0	Identify the major ecosystems in Florida. The student will be able to:
26.01	Define "ecosystem" and identify the major ecosystems in Florida.
26.02	Identify common plant and animal species of the major ecosystems.
26.03	Identify environmental factors affecting each ecosystem in Florida.
26.04	Identify habitats of the most threatened and endangered plant and animal species in Florida.
26.05	Identify the hydrologic cycle of and the major uses for water.
27.0	Perform monitoring of water resources. The student will be able to:
27.01	Determine stream flow.
27.02	Monitor water levels of rivers, streams, ponds, and lakes.

CTE Standards and Benchmarks	
	27.03 Identify and monitor erosion hazards and environmental quality.
28.0	Assist in controlling and using fire in forests and other lands. The student will be able to:
	28.01 Identify the major causes of wildfire.
	28.02 Assist in determining fire danger in forests and other lands.
	28.03 Describe personal safety procedures for wildland fire fighters.
	28.04 Identify and describe the use of basic tools for wildland firefighting.
	28.05 Explain the uses of prescribed burning in forestry, natural resources, and wildlife management.
	28.06 Identify the different types of burning assistance that are available through agencies or vendors.
29.0	Assist in managing forest pests. The student will be able to:
	29.01 Identify common forest pests, insects, and diseases.
	29.02 Assist with common forest pest control.
	29.03 Assist with chemical, mechanical, and other controls of undesirable species.
30.0	Identify applicable local, state, and federal rules and regulations and assistance programs. The student will be able to:
	30.01 Locate applicable portions of comprehensive plans.
	30.02 Identify agencies affecting land and wildlife utilization.
	30.03 Identify agencies regulating employee/employer relations (e.g., the Occupational Safety and Health Administration [OSHA]).
	30.04 Identify public- and private-assistance programs for private-land owners.
	30.05 Describe applicable local, state, and federal rules and regulations.
31.0	Apply multi-use principles to forests and other lands. The student will be able to:
	31.01 Assist in preparing a multi-use plan for forests and other lands.
32.0	Use aerial photographs and maps. The student will be able to:
	32.01 Use maps and aerial photographs for determining acreage.

CTE Standards and Benchmarks	
	32.02 Use aerial photographs to identify major timber types and land features.
33.0	Collect and test water samples. The student will be able to:
	33.01 Collect, store, and label water samples.
34.0	Interpret soil survey data. The student will be able to:
	34.01 Apply soil survey information to silvicultural practices and environmental management.
35.0	Apply the principles of Best Management Practices (BMP). The student will be able to:
	35.01 Define the terms used in Best Management Practices (BMP).
	35.02 Determine erosion and slope coefficients, using the BMP manual.
	35.03 Solve problems in land use, applying the principles found in the BMP manual.
36.0	Identify technological advances in the industry. The student will be able to:
	36.01 Identify satellite surveying operations and laser systems.
	36.02 Identify satellite thermal infrared imagery.
	36.03 Identify computer mapping systems and geographic information systems.
	36.04 Use electronic communication devices.
	36.05 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications.
	36.06 Employ computer operations applications to access, create, manage, integrate, and store information.
	36.07 Employ collaborative/groupware applications to facilitate group work.
37.0	Identify wildlife population management practices. The student will be able to:
	37.01 Identify appropriate management practices for a wildlife habitat.
	37.02 Identify species of Florida's common wildlife (land and aquatic) and classify them as game, non-game, endangered, or threatened.
38.0	Identify multi-use principles for forest and other lands. The student will be able to:
	38.01 Identify the different types of leases and their necessary components.

CTE Standards and Benchmarks	
39.0	Apply basic financial management skills. The student will be able to:
	39.01 Calculate interest on loans.
	39.02 Complete selected income tax return forms.
40.0	Demonstrate leadership and management skills. The student will be able to:
	40.01 Demonstrate knowledge of how to make job changes appropriately.
	40.02 Apply the principles of time management, work simplification, and teamwork when performing assigned tasks.
	40.03 Describe the importance of a drug free workplace and the industry policies regarding drug use.
	40.04 Demonstrate appropriate responses to performance evaluations from an employer, a supervisor, or other persons in the workplace.

Florida Department of Education
Student Performance Standards

Course Title: **Forestry 4**
Course Number: **8118330**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of urban forest; timber marketing; business management skills; measuring trees and forest volume; silvicultural systems; prescribed burning; preventative maintenance.

CTE Standards and Benchmarks	
41.0	Apply the principles of basic nursery operations. The student will be able to:
41.01	Select the method of, and assist in, site preparation.
41.02	Care for seedlings from the nursery to planting.
41.03	Plant tree seedlings, using a hand or mechanical planter.
41.04	Explain the requirements for reforestation.
42.0	Assist in managing the urban forest. The student will be able to:
42.01	Assist in selecting, planting, and transplanting trees in the urban landscape.
42.02	Demonstrate proper tree pruning, trimming, and fertilization techniques.
42.03	Describe the procedure for an urban tree inventory.
42.04	Develop a vegetative plan for improving wildlife habitat in urban areas.
42.05	Develop a plan for the basic maintenance of tree health.
43.0	Apply business management skills and identify appropriate legal documents. The student will be able to:
43.01	Identify business liability and the use of liability insurance.
43.02	Identify eligibility requirements for greenbelt, bluebelt, and homestead tax exemptions.
43.03	Identify the characteristics of legal documents (such as contracts, deeds, and leases).

CTE Standards and Benchmarks	
44.0	Explain the basic silvicultural systems used in forest management. The student will be able to:
44.01	Identify basic silvicultural systems.
44.02	Conduct a site evaluation.
44.03	Select tree species according to the site evaluation.
44.04	Explain the requirements for tree growth for effective forest management.
44.05	Determine site quality and growth rate for a timber stand.
44.06	Prepare a basic forest management plan, including cost and profit analyses.
45.0	Prescribe burning for forest management. The student will be able to:
45.01	Develop a plan for a prescribed burning, including authorizations, maps, and descriptions of desirable burning conditions and fire lines.
45.02	Describe the requirements for obtaining different types of burning authorization and the applicable restrictions.
45.03	Prepare a sample prescribed burning authorization request using the phone or website.
45.04	Explain the effects of fuel characteristics and weather factors on fire behavior.
45.05	Identify the precautions to be followed in using fire as a management tool.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access.

Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Horticulture Science and Services**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8121600
CIP Number	0101060610
Grade Level	9-12
Program Length	6 credits
Teacher Certification	Refer to the **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	19-1013 -- Soil and Plant Scientist 37-1012 -- First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of six courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

This program is a planned sequence of instruction consisting of a core and two completion points.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit		3	EQ
8121510	Introductory Horticulture 2	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit	37-1012	3	CT
8121520	Horticulture Science 3	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit	37-1012	3	CT
8121610	Horticulture Science and Services 4	AGRICULTUR 1 @2 AGRICULTUR 7G HORTICULT #7	1 credit	19-1013	2	CT
8121620	Horticulture Science and Services 5	AGRICULTUR 1 @2 AGRICULTUR 7G HORTICULT #7	1 credit	19-1013	2	CT
8121630	Horticulture Science and Services 6	AGRICULTUR 1 @2 AGRICULTUR 7G HORTICULT #7	1 credit	19-1013	2	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Introductory Horticulture 2

09.0 Describe the horticulture industry.
10.0 Identify safety procedures in the workplace.
11.0 Identify and classify plants.
12.0 Demonstrate plant propagation techniques.
13.0 Identify growing media and fertilizers.
14.0 Explain irrigation techniques for plants and turf.
15.0 Describe Integrated Pest Management approaches.
16.0 Describe the principles and requirements of plant growth.
17.0 Apply best management practices in the horticulture industry.
18.0 Identify principles of landscape design.
19.0 Describe varieties and care of indoor plants.

Horticulture Science 3

20.0 Apply safety procedures in the workplace.
21.0 Classify plants based on scientific principles.
22.0 Demonstrate proper use of growing media and fertilizers.
23.0 Demonstrate Integrated Pest Management approaches.
24.0 Identify the principles and requirements of plant growth.
25.0 Apply best management practices in landscape design.
26.0 Demonstrate customer service skills that are essential in dealing with clients.
27.0 Apply principles of landscape design and maintenance.
28.0 Harvest, transport, and install plant materials.
29.0 Identify procedures to operate, repair, and maintain tools and equipment.
30.0 Identify emerging technologies in the horticulture industry.
31.0 Demonstrate leadership, employability, communications and human relations skills.

32.0 Describe personal traits, attitudes, customer approaches, and activities that help successful selling.

Horticulture Science and Services 4
33.0 Propagate plants.
34.0 Safely operate, repair, and maintain tools and equipment.
35.0 Prepare growing media.
36.0 Irrigate plants.
37.0 Maintain and analyze records (using spread sheet, word processing, and presentation software).
38.0 Apply proper fertilizer application components.

Horticulture Science and Services 5
39.0 Classify plants.
40.0 Irrigate plants using an irrigation system.
41.0 Maintain and analyze records (using spread sheet, word processing, and presentation software).
42.0 Fertilize plant material.
43.0 Control Pests using Integrated Pest Management Practices.

Horticulture Science and Services 6
44.0 Safely operate tools and equipment.
45.0 Maintain irrigation systems.
46.0 Maintain and analyze production records.
47.0 Manage and use fertilization schedules using spread sheet software.
48.0 Use a pest control system.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Introductory Horticulture 2**
Course Number: **8121510**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of career opportunities; global importance of agriculture; plant classification; propagation; growing media; nutritional needs; fertilization; irrigation; pest identification; pest control, pruning; plant installation; transplanting; safe hand-tool use; and employability skills.

CTE Standards and Benchmarks		National Standards
09.0	Describe the horticulture industry. The student will be able to:	
09.01	Describe the importance of horticulture to the American and global economies.	
09.02	Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.	
09.03	Describe Florida laws and regulation as they apply to the horticulture industry.	
09.04	Describe the importance of horticulture to the environment, including sustainability practices	
10.0	Identify safety procedures in the workplace. The student will be able to:	
10.01	Identify the common causes of accidents in the horticulture industry.	
10.02	Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.	
10.03	Explain, identify and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) according to Environmental Protection Agency (EPA), Worker Protection Standard and Occupational Safety and Health Agency (OHSA) Regulations.	
11.0	Identify and classify plants. The student will be able to:	
11.01	Identify plants by botanical and common names.	PS.02.01.02.b
11.02	Classify plants botanically.	PS.02.01.02.c
11.03	Write botanical names for plants.	

CTE Standards and Benchmarks		National Standards
12.0	Demonstrate plant propagation techniques. The student will be able to:	
12.01	Identify propagating and growing facilities and structures.	
12.02	Prepare propagation media.	PS.01.02.01.a
12.03	Select and collect propagation materials.	PS.01.02.01.c
12.04	Demonstrate propagation by sexual and asexual methods.	PS.03.01.01.b PS.03.01.03.b
12.05	Demonstrate environmental controls for propagation materials.	
12.06	Identify and select proper rooting hormones based on plant characteristics.	
13.0	Identify growing media and fertilizers. The student will be able to:	
13.01	Identify soil and media materials and appropriate containers.	
13.02	Identify nutritional needs of plants.	PS.01.03.01.a
13.03	Identify symptoms of nutritional deficiencies and toxicities of plants.	PS.01.03.02.c
13.04	Identify types and kinds of fertilizers.	PS.01.03.04.a
13.05	Identify methods of distributing fertilizers.	PS.01.03.04.c
13.06	Interpret information on a label of fertilizer used in Florida.	
14.0	Explain irrigation techniques for plants and turf. The student will be able to:	
14.01	Identify water needs of plants.	PS.01.01.03.a
14.02	Irrigate plants at recommended rates.	
14.03	Identify the symptoms of excessive water and water stress in plants.	
14.04	Describe the basic irrigation systems and principles used in the landscape and nursery.	
15.0	Describe Integrated Pest Management approaches. The student will be able to:	
15.01	Identify common pests and pathogens of plants.	PS.03.03.01.a
15.02	Describe life cycles of common pests and pathogens of plants.	PS.03.03.02.a

CTE Standards and Benchmarks		National Standards
15.03	Recognize signs of damage from pests and pathogens.	PS.03.03.02
16.0	Describe the principles and requirements of plant growth. The student will be able to:	
16.01	Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis and respiration.	PS.02.03.01.a
16.02	Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.	PS.02.03.01.b
16.03	Explain the process of respiration and transpiration and describe the flow of energy in plants.	PS.02.03.02.b
16.04	Describe the influence of light and temperature on plant growth including phototropism.	
17.0	Apply best management practices in the horticulture industry. The student will be able to:	
17.01	Identify and apply Best Management Practices to reduce pollution and conserve water.	
17.02	Identify and apply Best Management Practices on fertilizer recommendations for Florida plants including turf.	
17.03	Explain the concept of nonpoint source pollution, and the watershed environment.	
18.0	Identify principles of landscape design. The student will be able to:	
18.01	Conduct a customer interview to determine needs and personal tastes of client.	PS.04.02.01.a
18.02	Compare and contrast the use of line, form, texture and color in designing landscapes.	
18.03	Identify the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.	PS.04.02.02.b
18.04	Identify points of emphasis and major design areas in the residential landscape.	
18.05	Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.	
18.06	Read and interpret a landscape plan.	
18.07	Develop skills for drawing and identifying symbols.	
18.08	Draw and design a landscape plan for a small garden.	
18.09	Explore types of landscape design software.	PS.04.02.02.c
19.0	Describe varieties and care of indoor plants. The students will be able to:	

CTE Standards and Benchmarks	National Standards
19.01 Identify common indoor plants	
19.02 Describe the lighting and environmental needs of indoor plants.	
19.03 Describe water, cleaning, and fertilizations needs for plants used indoors.	
19.04 Describe the most common problems with indoor foliage including pathogens, pests, and cultural damage.	
19.05 Analyze the air quality benefits of indoor plants.	
19.06 Explain proper chemical use and application of plants indoors in accordance with governmental and public safety regulations.	

Florida Department of Education
Student Performance Standards

Course Title: **Horticulture Science 3**
Course Number: **8121520**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of industry regulations; plant classification; plant transportation; soil sampling and analysis; fertilizer calculations; recording keeping; irrigation components, water quality; drainage; integrated pest management; pesticide safety and regulations; equipment calibration; chemical growth regulators; xeriscaping; integrated landscape management; safe use of power equipment; record keeping; and employability skills.

CTE Standards and Benchmarks		National Standards
20.0	Apply safety procedures in the workplace. The student will be able to:	
20.01	Describe emergency procedures in the horticulture workplace.	CS.03.03.02.b
20.02	Create preventive measures to avoid hazardous situations.	CS.03.03.01.a
20.03	Identify appropriate PPE (Personal Protective Equipment) for all activities.	CS.03.04.01.b
20.04	Use MSDS for all materials used.	CS.03.01.01.a
20.05	Identify specific hazards with industry specific equipment, and conduct equipment care and maintenance.	CS.03.04.02.a
20.06	Apply problem solving skills to correct a hazardous situation.	CS.03.01.02.c
21.0	Classify plants based on scientific principles. The student will be able to:	
21.01	Describe principles of plant biology and growth.	PS.01.01.01.a
21.02	Explain the role of plants in the ecosystem.	
21.03	Describe the major classifications of plants based on life cycle.	PS.02.01.01.c
21.04	Demonstrate the use of botanical and common names of plants including genus and specific epithet and cultivar.	PS.02.01.02.c
21.05	Demonstrate proper use of botanical names.	PS.02.01.01.a
22.0	Demonstrate proper use of growing media and fertilizers. The student will be able to:	

CTE Standards and Benchmarks		National Standards
22.01	Apply information on a label of fertilizer, including updated BMP rules, used in Florida.	PS.01.03.04.b
22.02	Apply fertilizer and soil amendments.	
22.03	Identify materials that are needed to alter pH and calculate the amount to apply to change the pH.	PS.01.03.02.a
22.04	Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.	PS.01.03.04.c
22.05	Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.	PS.01.03.01.a
22.06	Using references make fertilizer recommendations for ornamental plants, turf grass, and palms.	PS.01.03.03.c
23.0	Demonstrate Integrated Pest Management approaches. The student will be able to:	
23.01	Classify insects according to feeding habits.	PS.03.03.01.a
23.02	Describe IMP (Integrated Pest Management) methods of controlling plant pests.	PS.03.03.03.a
23.03	Diagnose and outline a plan for controlling pests on a horticultural crop.	PS.03.03.03.c
23.04	Describe methods of controlling nematode pests on ornamental plants, and use BMPs to prevent infestation..	
23.05	Develop a pest control program for a horticultural crop using Integrated Pest Management.	
23.06	Identify specific cultural, mechanical, chemical, and biological methods of weed management.	
23.07	Identify evasive and poisonous plants in Florida.	
23.08	Identify types of weeds common to Florida.	
24.0	Identify the principles and requirements of plant growth. The student will be able to:	
24.01	Demonstrate methods of pruning plants.	
24.02	Identify appropriate time to prune plants.	
24.03	Identify and select pruning tools.	
24.04	Demonstrate proper use of pruning tools and care.	
24.05	Demonstrate sanitation of tools to prevent the spread of disease.	
24.06	Identify Plant Growth Regulators and their use on horticulture and landscape plants.	

CTE Standards and Benchmarks		National Standards
	24.07 Provide a summary of results for the application on the specific crop.	
	24.08 Identify appropriate pruning techniques to achieve plant size, form, and shape.	
25.0	Apply best management practices in landscape design. The student will be able to:	
	25.01 Identify and apply Best Management Practices for the design and installation of landscapes.	PS.04.01.01.a
	25.02 Identify and apply Best Management Practices on the management and handling of pesticides.	
26.0	Demonstrate customer service skills that are essential in dealing with clients. The student will be able to:	
	26.01 Demonstrate ability to communicate clearly with the client.	
	26.02 Conduct a walk through and interview with client to assure clear vision.	
	26.03 Identify future expectations of the client relationship.	
27.0	Apply principles of landscape design and maintenance. The student will be able to:	
	27.01 Demonstrate the use of line, form, texture and color in designing landscapes.	PS.04.01.01.c
	27.02 Demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.	PS.04.02.01.a
	27.03 Apply points of emphasis and major design areas in the commercial landscape.	
	27.04 Identify plant selection for a commercial and residential landscape using Florida Friendly Landscape Principles.	
	27.05 Create a landscape plan for a residential or commercial property.	
	27.06 Create a complete estimate and proposal for a project.	
	27.07 Identify factors in selecting turf for landscape installation.	
	27.08 Identify parts of an estimate and proposal for a project.	
28.0	Harvest, transport, and install plant materials. The student will be able to:	
	28.01 Determine requirements for preserving plant viability.	
	28.02 Demonstrate proper landscape plant establishment techniques.	
	28.03 Select and prepare plants for transporting and transplanting.	

CTE Standards and Benchmarks		National Standards
	28.04 Select horticultural products according to Florida grades and standards.	
29.0	Identify procedures to operate, repair, and maintain tools and equipment. The student will be able to:	
	29.01 Perform equipment pre-operational check.	
	29.02 Identify, maintain, and operate hand tools and power tools.	
30.0	Identify emerging technologies in the horticulture industry. The student will be able to:	
	30.01 Research DNA and genetic applications in horticulture including the theory of probability.	
	30.02 Research advances in biotechnology that impact horticulture. (e.g., transgenic crops, biological controls, micro propagation etc.).	
	30.03 Research ways that GIS, Remote sensing, and precision agriculture, and UAV (Unmanned Altererian Vehicles) are used in the Horticulture industry.	
31.0	Demonstrate leadership, employability, communications, and human relations skills. The student will be able to:	
	31.01 Identify appropriate work habits and personal characteristics.	
	31.02 Identify proper employee hygiene habits.	
	31.03 Identify or demonstrate appropriate responses to criticism from employer,	
	31.04 Describe the importance of employee industry certifications.	
	31.05 Discuss education opportunities available in the area of Horticulture.	
32.0	Describe personal traits, attitudes, customer approaches, and activities that help successful selling. The student will be able to:	
	32.01 Demonstrate proper customer communication techniques.	
	32.02 Determine your products pricing structure.	
	32.03 Discuss components of customer satisfaction.	

Florida Department of Education
Student Performance Standards

Course Title: **Horticulture Science and Services 4**
Course Number: **8121610**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of plant identification and classification; growing media; irrigation system set up; and maintaining and analyzing records including production costs.

CTE Standards and Benchmarks	
33.0	Propagate plants. The student will be able to:
33.01	Prepare propagation materials (seeds, cuttings, etc.) for planting.
33.02	Discuss cultural requirements for propagations including temperature, light, and moisture.
33.03	Demonstrate sanitation and safety practices when propagating.
34.0	Safely operate, repair, and maintain tools and equipment. The student will be able to:
34.01	Identify, operate, and maintain tractor and power equipment.
35.0	Prepare growing media. The student will be able to:
35.01	Sterilize rooting, potting, and growing media.
35.02	Adjust pH and nutritional levels of media.
35.03	Fill and level benches and pots with media.
35.04	Demonstrate sanitation practices when handling and storing plant media materials.
36.0	Irrigate plants. The student will be able to:
36.01	Identify the components of irrigation systems.
36.02	Explain why different types of irrigation systems are needed.
36.03	List problems associated with improper design, installation, and maintenance.

CTE Standards and Benchmarks	
	36.04 Explain and apply Best Management Practices as they apply to irrigation.
	36.05 Apply general knowledge of appropriate state laws to irrigation practices.
37.0	Maintain and analyze records (using spread sheet, word processing, and presentation software). The student will be able to:
	37.01 Create a plant and inventory supply list.
	37.02 Maintain current plant and supply inventory.
	37.03 Maintain job records, daily log sheets, and inventory.
	37.04 Calculate labor costs involved with product pricing.
38.0	Apply proper fertilizer application components. The student will be able to:
	38.01 Determine proper application based on characteristics of plant species.
	38.02 Examine how fertilizer application affects the water bodies in Florida.

Florida Department of Education
Student Performance Standards

Course Title: **Horticulture Science and Services 5**
Course Number: **8121620**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of identifying and evaluating IPM practices; maintaining and repairing irrigation systems; analyzing and evaluating fertilizer usage.

CTE Standards and Benchmarks	
39.0	Classify plants. The student will be able to:
39.01	Identify plants appropriate to a region.
39.02	Classify plants according to growth habit.
39.03	Supply growth stimulants to propagation materials
39.04	Prepare flats and seedbeds and plant seeds.
40.0	Irrigate plants using an irrigation system. The student will be able to:
40.01	Use various types of irrigation systems (low volume, ebb and flow, drip, mat, re-circulating, etc.).
41.0	Maintain and analyze records (using spread sheet, word processing, and presentation software). The student will be able to:
41.01	Prepare and maintain financial records.
42.0	Fertilize plant materials. The student will be able to:
42.01	Collect soil and leaf tissue samples for analysis.
42.02	Demonstrate proper handling and storage of fertilizers, observing safety precautions.
42.03	Evaluate, operate, and maintain fertilizer distribution equipment.
42.04	Create fertilizer schedule and/ or record of applications.
43.0	Control pests using Integrated Pest Management Practices. The student will be able to:

CTE Standards and Benchmarks
43.01 Conduct a scouting in a nursery or landscape setting.
43.02 Report insect and disease damage.
43.03 Describe the differences between common and exotic pests.
43.04 Identify chemical spray damage.

Florida Department of Education
Student Performance Standards

Course Title: **Horticulture Science and Services 6**
Course Number: **8121630**
Course Credit: **1**

Course Description:

This course is designed to further develop competencies in the areas of irrigation; growing media; planting beds and sites; propagation; marketing; repair and maintenance of nursery equipment and facilities.

CTE Standards and Benchmarks	
44.0	Safely operate tools and equipment. The student will be able to:
44.01	Load, secure, and transport equipment.
45.0	Maintain irrigation systems. The student will be able to:
45.01	Maintain and repair an irrigation system.
45.02	Assemble a drip/mist irrigation system for an ornamental crop.
46.0	Maintain and analyze production records. The student will be able to:
46.01	Analyze and maintain production and sales records.
46.02	Determine plant production costs.
46.03	Prepare a budget.
47.0	Manage and use fertilization schedules using spread sheet software. The student will be able to:
47.01	Interpret and evaluate the results of soil and leaf tissue analysis and determine corrective actions.
47.02	Develop a fertilization schedule for various plant species.
47.03	Calculate rates of fertilizer application for turf, ornamental plants, and palms.
48.0	Use a pest control system. The student will be able to:
48.01	Select proper IPM practices (biological, chemical, and physical) for control of insects, diseases, vertebrates and weeds.
48.02	Evaluate the efficacy and phytotoxicity of a chemical prior to inclusion in a growing program.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Extended Student Supervision

Because of the production and marketing cycle of the agriculture industry, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Food Science Applications**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Secondary – Career Preparatory	
Program Number	8129200
CIP Number	0102030100
Grade Level	9-12
Program Length	3 credits
Teacher Certification	Refer to **Program Structure** section.
CTSO	FFA
SOC Codes (all applicable)	19-1012 -- Food Scientists and Technologists 35-1012 -- First-Line Supervisors of Food Preparation and Serving Workers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources (AFNR) career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in the application of biological, chemical, and physical principles of converting raw agricultural products into processed forms for human consumption and the storage of these products, human physiology and nutrition, food chemistry, agricultural products processing, food additives, food preparation and packaging,

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three courses. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise, or (6) Service Learning.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICULTUR 1 @2 AGRICULTUR 7G	1 credit		3	EQ
8129210	Food Science Applications 2		1 credit	35-1012	3	CT
8129220	Food Science Applications 3		1 credit	19-1012	3	CT

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

National Standards (NS): Council for Agricultural Education

Some or all of the courses in this program have been aligned with National Standards AFNR Standards from the Council for Agricultural Education. If so, the standards have been identified and cross walked with the corresponding CTE standard and/or benchmark. National Standards can be found by accessing the following link: https://ffa.app.box.com/v/Library/folder/52815452676.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Agriscience Foundations 1

01.0 Examine the history of AFNR production at the local, national, and global level.
02.0 Employ scientific reasoning to make informed decisions in AFNR systems.
03.0 Apply scientific skills and principles in natural resources.
04.0 Apply scientific skills and principles in plant science.
05.0 Apply scientific skills and principles in animal science.
06.0 Apply scientific skills and principles in food science.
07.0 Apply scientific skills and principles in power, structure, and technical systems.
08.0 Explore AFNR professional development organizations.

Food Science Applications 2

09.0 Evaluate the significance and implications of changes and trends in the food products and processing industry.
10.0 Analyze the dangers of food hazards.
11.0 Apply safety and sanitation procedures in the handling, processing and storing of food products.
12.0 Discuss the role of regulatory agencies in the food industry.
13.0 Manage operational procedures and create equipment and facility maintenance plans.
14.0 Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters.
15.0 Describe the biological composition and processing of foods.
16.0 Create food distribution plans and procedures to ensure safe delivery of food products.
17.0 Demonstrate leadership, employability, communications and human relation skills.
18.0 Apply principles of nutrition and biology to develop food products that provide a safe, wholesome and nutritious food supply for local and global food systems.

Food Science Applications 3

19.0 Utilize harvesting, selection and inspection techniques to obtain quality food products for processing.
20.0 Apply principles of molecular biology and chemistry to develop food products to provide a safe wholesome and nutritious food supply for local and global food systems.
21.0 Process, preserve, package and present food and food products for sale and distribution.
22.0 Explain the process of food product development.
23.0 Analyze the components of the marketing chain.
24.0 Discuss food production distribution.
25.0 Identify industry organizations, groups and regulatory agencies affecting the food products and processing industry.
26.0 Describe the economic and cultural impact of the global food market.
27.0 Discuss environmental issues impacting the production and processing of foods.
28.0 Demonstrate leadership, employability, communications and human relation skills.
29.0 Examine the scope of the food industry by evaluating local and global polices, trends, and customs for food production.

Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Agriscience Foundations 1 (8106810) is part of several programs across the Agriculture, Food & Natural Resources career cluster. To ensure consistency, the standards and benchmarks for this course (01.0 – 8.0) have been placed in a separate document. To access this document, visit: https://www.fldoe.org/core/fileparse.php/20706/urlt/Agsci-Fnds1-Core-2425.rtf

Florida Department of Education
Student Performance Standards

Course Title: **Food Science Applications 2**
Course Number: **8129210**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the concepts related to: the use of taste and other sensory tests in developing foods; the application of scientific principles in food processing; food marketing; nutritional and economic value of plant-based food products; safe and efficient distribution and handling of food products; environmental factors in food production and processing; the global and historical impact of food on people; and employability skills necessary in the food industry.

CTE Standards and Benchmarks		National Standards
09.0	Evaluate the significance and implications of changes and trends in the food products and processing industry. The student will be able to:	
09.01	Research and summarize the purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures, Good Manufacturing Practices, worker safety).	FPP.01.01.01.a
09.02	Identify methods of food preservation and give examples of foods preserved by each method.	FPP.03.02.03.a
09.03	Analyze and document attributes procedures of current safety programs in food products and processing facility.	FPP.01.01.01.b
09.04	Devise and apply strategies to preserve foods using various methods and techniques.	FPP.03.02.03.c
09.05	Construct plans that ensure implementation of safety programs for food products and processing industry.	FPP.01.01.01.c
09.06	Identify and explain environmental and safety concerns about the food supply.	FPP.04.02.02.a
09.07	Research and summarize current issues related to the safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, and irradiation).	FPP.04.02.02.b
09.08	Examine and respond to consumer concerns about the environment and safety of the food supply using accurate information regarding food products and processing systems and practices.	FPP.04.02.02.c
10.0	Analyze the dangers of food hazards. The student will be able to:	
10.01	Explain types of biological hazards.	
10.02	Explain types of chemical hazards.	
10.03	Explain types of physical hazards.	

	10.04 Identify the roles food allergens play in food safety (e.g., Milk, egg, fish, shellfish, tree nuts, wheat, peanuts, soybeans).	
11.0	Apply safety and sanitation procedures in the handling, processing, and storing of food products. The student will be able to:	
	11.01 Research and summarize procedures of safe handling protocols (e.g., Hazard Analysis and Critical Control Points Plan (HACCP); Critical control Points procedures (CCP), Good Agriculture Practices Plan (GAP)).	FPP.01.02.02.a
	11.02 Construct plans that ensure implementation of safe handling procedures on food products.	FPP.01.02.02.b
	11.03 Examine, interpret, and report outcomes from safe handling procedures.	FPP.01.02.02.c
	11.04 Interpret and evaluate quality-assurance tests on food products and examine steps to and implement corrective procedures.	FPP.01.02.03.c
	11.05 Describe the effects food-borne pathogens have on food products and humans.	FPP.01.02.04.a
	11.06 Explain, document, and execute the procedures of microbiobial tests used to detect food borne pathogens.	FPP.01.02.04.b
12.0	Discuss the role of regulatory agencies in the food industry. The student will be able to:	
	12.01 Examine and describe the importance and usage of regulatory oversight of food safety and security in food products and processing.	FPP.04.03.02.a
	12.02 Assess and summarize the application if industry standards in the food products and processing industry.	FPP.04.03.02.b
	12.03 Construct and implement plans that ensure adherence to industry standards for food products and processing.	FPP.04.03.02.c
13.0	Manage operational procedures and create equipment and facility maintenance plans. The student will be able to:	
	13.01 Identify and describe protocols for inspection and harvesting techniques for food products.	FPP.03.01.04.a
	13.02 Explain the functions of the 8 Good Agriculture Practices (GAP).	
	13.03 Research and categorize types of equipment used in food products and processing systems.	FPP.01.01.01.a
	13.04 Assess specifications and maintenance needs for equipment and facilities used in food products and processing systems (e.g., Specifications for machines, sanitation procedures, repair protocols)	FPP.01.01.02.b
	13.05 Devise and implement strategies to maintain equipment to maintain equipment and facilities for food products and processing systems.	FPP.01.01.02.c
14.0	Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters. The student will be able to:	
	14.01 Examine and identify contamination hazards associated with food products and processing (physical, chemical and biological)	FPP.01.02.01.a
	14.02 Outline procedures to eliminate possible contamination hazards associated with food products and processing.	FPP.01.02.01.b

	14.03 Explain the implementation of the seven principles of HACCP.	
	14.04 Create an HACCP program for a food products and processing facility.	
15.0	Describe the biological composition and processing of foods. The student will be able to:	
	15.01 Research and summarize the application of biochemistry in the development of new food products.	FPP.02.02.03.a
	15.02 Examine the principles of managing Food, Acid, Time, Temperature, Oxygen, and Moisture (FATTOM) in controlling food spoilage.	
	15.03 Test the effects of yeasts, bacteria, molds, and enzymes in food processing.	
16.0	Create food distribution plans and procedures to ensure safe delivery of food products. The student will be able to:	
	16.01 Assess and describe the environmental impact of distributing food locally and globally.	FPP.03.03.01.a
	16.02 Examine the various paths food products take to get from food processing centers to consumers.	FPP.03.03.02.a
	16.03 Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.	FPP.03.03.02.b
	16.04 Make recommendations to improve safety procedures used in food distribution scenarios to ensure a safe product is being delivered to consumers.	FPP.03.03.02.c
	16.05 Research and summarize different types of market demands for food products (e.g., Local food, organic, non-GMO).	FPP.03.03.03.a
	16.06 Assess and explain how market demand for food products influences the distribution of food products.	FPP.03.03.03.b
	16.07 Propose distribution plans for food products that meet specific market demands.	FPP.03.03.03.c
	16.08 Research and evaluate different crisis management plans (e.g., Food recalls, bioterrorism).	
17.0	Demonstrate leadership, employability, communications, and human relation skills. The student will be able to:	
	17.01 Investigate career opportunities in the food industry and identify educational experiences necessary to prepare for those careers.	
	17.02 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.	
18.0	Apply principles of nutrition and biology to develop food products that provide a safe, wholesome, and nutritious food supply for local and global food systems. The student will be able to:	
	18.01 Research and summarize properties of common food constituents (e.g., Proteins, carbohydrates, fats, vitamins, and minerals).	FPP.02.01.01.a
	18.02 Compare and contrast the relative value of food constituents relative to food product qualities (e.g., taste, and appearance).	FPP.02.01.01.b

18.03	Analyze the properties of food products to identify food constituents and evaluate nutritional value.	FPP.02.01.01.c
18.04	Research and report methods of nutritional planning to meet essential needs for the human diet. (e.g., My plate)	FPP.02.01.02.a
18.05	Compare and contrast the nutritional needs of different human diets.	FPP.02.01.02.b
18.06	Construct methods to design a healthy daily food guide for a variety of nutritional needs. (e.g., My plate)	FPP.02.01.02.c

Florida Department of Education
Student Performance Standards

Course Title: **Food Science Applications 3**
Course Number: **8129220**
Course Credit: **1**

Course Description:

This course is designed to develop competencies the food industry. The course addresses concepts related to: developing new food products; scientific experimentation with the chemical and biological components of foods; the impact of microbes in food production; the nutritional and economic value of animal-based food products; food spoilage and waste management; safety and security risks in the food supply; the international trade of foods; and employability skills necessary in the food industry.

CTE Standards and Benchmarks		National Standards
19.0	Utilize harvesting, selection, and inspection techniques to obtain quality food products for processing. The student will be able to:	
19.01	Summarize foods derived from different classifications of food products (e.g., Meat, egg, poultry, fish, dairy, fruits, vegetables, grains, legumes, and oilseeds).	FPP.03.01.04.a
19.02	Summarize characteristics of quality and yield grades of food products.	FPP.03.01.01.a
19.03	Analyze factors that affect quality and yield grades of food products.	FPP.03.01.01.b
19.04	Evaluate and grade food products from different classifications of food products.	FPP.03.01.04.c
19.05	Develop, apply, and evaluate care and handling procedures to maintain original food and quality yield.	
19.06	Examine and evaluate inspection and harvesting of animals using regulatory agency approved or industry approved techniques.	FPP.03.01.03.c
19.07	Examine and respond to consumer concerns about the inspection and harvesting techniques of animals using accurate information based on regulatory agency approved or industry approved techniques.	FPP.03.01.03.c
20.0	Apply principles of molecular biology and chemistry to develop food products to provide a safe wholesome and nutritious food supply for local and global food systems. The student will be able to:	
20.01	Examine and describe the basic chemical makeup of different types of food.	FPP.02.02.01.a
20.02	Explain how the chemical and physical properties of foods influence nutritional value and eating quality.	FPP.02.02.01.b
20.03	Design and conduct experiments to determine the chemical and physical properties of food products.	FPP.02.02.01.c
20.04	Identify common food additives and compare their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors, etc.).	FPP.02.02.02.a

CTE Standards and Benchmarks		National Standards
	20.05 Describe the purpose of common food additives and how they influence the chemistry of food.	FPP.02.02.02.b
	20.06 Devise and apply strategies to determine what additives are utilized and why they are included in a variety of food products.	FPP.02.02.02.c
	20.07 Research and summarize the application of biochemistry in the development of new food products (e.g., value added food products, genetically engineered food products).	FPP.02.02.03.a
	20.08 Analyze how food products and processing facilities use biochemistry concepts to develop new food products.	FPP.02.02.03.b
	20.09 Develop and implement plans to engineer new food items using biochemistry concepts.	FPP.02.02.03.c
21.0	Process, preserve, package and present food and food products for sale and distribution. The student will be able to:	
	21.01 Identify and explain English and metric measurements used in the food products and processing system.	FPP.03.02.01.a
	21.02 Compare weights and measurements of products and perform conversions between units of measure.	FPP.03.02.01.b
	21.03 Design plans to formulate and package food products using a variety of weights and measures.	FPP.03.02.01.c
	21.04 Differentiate methods and materials for processing foods for sale as fresh-food products.	FPP.03.02.02.a
	21.05 Outline appropriate methods and prepare foods for sale and distribution as fresh-food products.	FPP.03.02.02.b
	21.06 Evaluate food quality factors on foods prepared for different markets (based on factors such as shelf life, shrinkage, appearance, and weight).	FPP.03.02.02.c
	21.07 Identify methods of food preservation and give examples of foods preserved by each method.	FPP.04.03.03.a
	21.08 Analyze and document food preservation processes and methods on a variety of food products.	FPP.03.02.03.b
	21.09 Summarize types of materials and methods used in food packaging and presentation.	FPP.03.02.04.a
	21.10 Construct and implement methods of selecting packaging materials to store a variety of food products.	FPP.03.02.04.c
	21.11 Analyze the degree of desirable food qualities of foods stored in various packaging.	FPP.03.02.04.b
	21.12 Identify and summarize purposes of food storage procedures (first in/first out, temperature regulations)	FPP.01.03.01.a
	21.13 Analyze characteristics of food products and determine appropriate storage procedures.	FPP.01.03.01.b
	21.14 Prepare plans that ensure implementation of proper food storage procedures.	FPP.01.03.01.c
22.0	Explain the process of food product development. The student will be able to:	

CTE Standards and Benchmarks		National Standards
	22.01 Research and summarize relevant factors in planning and developing a new food product.	FPP.02.03.02.a
	22.02 Determine consumer preference and market potential for a new food product using a variety of methods.	FPP.02.03.02.b
	22.03 Design new food products that meet a variety of goals.	FPP.02.02.02.c
	22.04 Develop a new food product.	
	22.05 Conduct and analyze a food market test.	
	22.06 Apply sensory analysis techniques.	
	22.07 Conduct a cost analysis for a new food product.	
23.0	Analyze the components of the marketing chain. The student will be able to:	
	23.01 Examine and explain the importance of food labeling to the consumer.	FPP.02.03.01.a
	23.02 Examine, interpret, and explain the meaning of required components of a food label.	FPP.02.03.01.b
	23.03 Determine a strategy to prepare and label foods according to the established standards of regulatory agencies.	FPP.02.03.01.c
24.0	Discuss food production distribution. The student will be able to:	
	24.01 Research ways to reduce environmental impact from food distribution activities.	FPP.03.03.01.b
	24.02 Devise and defend a strategy to determine ways for food distribution to reduce environmental impacts.	FPP.03.03.01.c
25.0	Identify industry organizations, groups and regulatory agencies affecting the food products and processing industry. The student will be able to:	
	25.01 Examine and summarize the purposes of organizations that influence or regulate the food products and processing industry.	FPP.04.03.01.a
	25.02 Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.	FPP.04.03.02.b
	25.03 Construct and implement methods to obtain data about organizations, groups and regulatory agencies that affect the food products and processing industry.	FPP.04.03.01.c
26.0	Describe the economic and cultural impact of the global food market. The student will be able to:	
	26.01 Describe and explain the components of food products and the processing industry.	FPP.04.02.01.a
	26.02 Analyze and document significant changes and trends in the food products and processing industry.	FPP.04.02.01.b

CTE Standards and Benchmarks		National Standards
	26.03 Predict and defend upcoming changes and trends in food products and the processing industry.	FPP.04.02.01.c
	26.04 Research and describe currents and emerging technologies related to food products and processing	FPP.04.02.03.a
	26.05 Evaluate desirable and undesirable outcomes of emerging technologies used in food and processing systems.	FPP.04.02.03.b
	26.06 Research and evaluate the feasibility of implementing a current or emerging technology to improve a current food product or process used in a facility.	FPP.04.02.03.c
	26.07 Discusses possible causes of world hunger	
	26.08 Explain the relationship between global population growth and the food supply needs.	
27.0	Discuss environmental issues impacting the production and processing of foods. The student will be able to:	
	27.01 Describe the requirements of water used in food processing.	
	27.02 Discuss methods used in food processing for disposing of solid wastes.	
	27.03 Compare and contrast methods of wastewater management used in food processing.	
28.0	Demonstrate leadership, employability, communications and human relation skills. The student will be able to:	
	28.01 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.	
	28.02 Identify acceptable work habits and personal characteristics.	
	28.03 Identify acceptable employee hygiene habits.	
	28.04 Evaluate the importance of industry certifications.	
29.0	Examine the scope of the food industry by evaluating local and global polices, trends, and customs for food production. The student will be able to:	FPP.04.01
	29.01 Research and summarize examples of policy and legislation that affect food products and processing systems in the United States and around the world (e.g., labeling, GMOs, biosecurity, food system policy, dietary guidelines).	FPP.04.01.01.a
	29.02 Analyze the similarities and differences amongst policies and legislation that affect the food products and processing system in the U.S. or around the world.	FPP.04.01.01.b
	29.03 Articulate and defend a personal point of view on policies and legislation that affect the food products and processing system in the U.S. or around the world.	FPP.04.01.01.c
	29.04 Examine the impact of consumer trends on food products and processing practices (e.g., health and nutrition, organic, information about food products, local food movements, farm-to-fork supply chains, food	FPP.04.01.02.a.

CTE Standards and Benchmarks		National Standards
	system transparency).	
29.05	Devise and implement a strategy to create food products that meet a specific consumer trend in a specific market.	FPP.04.01.02.c.
29.06	Compare and contrast cultural differences regarding food products and processing practices.	FPP.04.01.03.a.
29.07	Analyze food production and distribution outcomes based on cultural customs.	FPP.04.01.03.b
29.08	Propose and implement culturally sensitive food processing and distribution practices.	FPP.04.01.03.c

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:
Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at SALA@fldoe.org

Career and Technical Student Organization (CTSO)

Florida FFA is the co-curricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Florida Department of Education
Curriculum Framework

Program Title: **Livestock Production Management**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101030200
Program Type	College Credit Certificate (CCC)
Program Length	30
CTSO	N/A
SOC Codes	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Agribusiness Management AS degree program (1101010100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to the fundamental care and management of beef production in the areas of movement, general health, pastures, and forages utilizing record keeping and industry standard practices of animal welfare.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Manage crops.
02.0 Manage livestock.
03.0 Manage machinery and equipment.
04.0 Manage facilities.
05.0 Keep and analyze financial, production and personnel records.
06.0 Integrate state and federal regulations into the operation.
07.0 Demonstrate leadership, communication, employability and human relations skills.

Florida Department of Education
Student Performance Standards

Program Title: **Livestock Production Management**
CIP Number: **0101000001**
Program Length: **30 credit hours**

This certificate program is part of the Agribusiness Management AS degree program (1101010100). At the completion of this program, the student will be able to:	
01.0	Manage crops. The student will be able to:
	01.01 Prepare a land use plan.
	01.02 Determine long-range conservation practices.
	01.03 Prepare soil for crops.
	01.04 Select crop varieties best suited for land, market and type of farm operation.
	01.05 Determine seeding/planting rate and spacing.
	01.06 Calibrate and adjust planting equipment
	01.07 Plant crops.
	01.08 Select appropriate cultural practices including cultivation, fertilization and irrigation.
	01.09 Identify and control diseases, insects and pests.
	01.10 Determine maturity of crops.
	01.11 Harvest crops.
	01.12 Store crops.
	01.13 Determine the most advantageous method of marketing crops.
02.0	Manage livestock. The student will be able to:
	02.01 Select and/or breed livestock.
	02.02 Determine nutritional requirements and balance livestock rations.

	02.03 Prepare a feeding schedule.
	02.04 Determine quality of pasture range or forage.
	02.05 Provide for winter rations and supplements.
	02.06 Maintain pasture fertility and quality.
	02.07 Develop a breeding/marketing plan for operation.
	02.08 Cull unproductive animals.
	02.09 Provide aid for animals with parturition problems.
	02.10 Care for newborn livestock.
	02.11 List causes of livestock infertility.
	02.12 Provide mineral supplement for animals.
	02.13 Determine most advantageous method of marketing livestock.
	02.14 Transport livestock.
	02.15 Identify and treat disorders, diseases and pests of livestock.
03.0	Manage machinery and equipment. The student will be able to:
	03.01 Assess needs for the purchases of new or replacement equipment.
	03.02 Maintain oil, fuel and hydraulic levels in equipment.
	03.03 Maintain tires, batteries and coolant system on all equipment and vehicles.
	03.04 Operate and service small gasoline engines.
	03.05 Replace hoses, belts and lines.
	03.06 Cut and weld with oxy-acetylene and arc welding equipment.
	03.07 Observe safety procedures when operating farm equipment.
	03.08 Develop a general maintenance schedule.
04.0	Manage facilities. The student will be able to:

	04.01 Safely operate and maintain general farm shop tools and equipment.
	04.02 Install and maintain electrical wiring and equipment.
	04.03 Square and build a farm structure.
	04.04 Determine a bill of materials for a farm construction project.
	04.05 Form and pour concrete.
	04.06 Build and repair fences, gates and pens.
	04.07 Develop a general maintenance schedule for facilities and equipment.
05.0	Keep and analyze financial, production and personnel records. The student will be able to:
	05.01 Keep fertilization and pesticide use records.
	05.02 Keep equipment maintenance and service records.
	05.03 Record cultural and production information.
	05.04 Determine cost efficiency of operations.
06.0	Integrate state and federal regulations into operation. The student will be able to:
	06.01 List agencies responsible for inspecting and regulating operation of product.
	06.02 Secure necessary inspection certificates and registrations.
	06.03 List reasons for the necessity of inspections, certifications and registrations.
07.0	Demonstrate leadership, communication, employability and human relations skills. The student will be able to:
	07.01 Develop citizenship awareness and responsibility.
	07.02 Demonstrate effective communication skills.
	07.03 Complete an employment application
	07.04 Demonstrate job interview skills.
	07.05 Demonstrate job interview skills.
	07.06 Recognize appropriate work habits.

07.07 Identify associations and societies associated with occupation or profession.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Aquaculture Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101030302
Program Type	College Credit Certificate (CCC)
Program Length	26 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Aquaculture Management AS degree program (1101030301).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the aquaculture industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in ichthyology, fish breeding, fish nutrition, pond maintenance, diagnosis and treatment of diseases in fish, business management of a fish farm, and field experience necessary to operate an aquaculture operation.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify important aquaculture plants and animals and describe their culture in various production units.
02.0 Perform general aquaculture production unit operations.
03.0 Determine methods of fish identification.
04.0 Demonstrate an understanding of water quality and aquaculture.
05.0 Maintain optimal nutrition for aquaculture organisms.
06.0 Diagnose and control common aquaculture maladies.
07.0 Operate and maintain aquaculture equipment.
08.0 Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms.
09.0 Perform general aquaculture nursery systems operations.

Florida Department of Education
Student Performance Standards

Program Title: **Aquaculture Technology**
CIP Number: **0101030302**
Program Length: **26 credit hours**

This certificate program is part of the Aquaculture Management AS degree program (1101030301). At the completion of this program, the student will be able to:	
01.0	Identify important aquaculture plants and animals and describe their culture in various production units. The student will be able to:
01.01	Define aquaculture and describe the historical important of aquaculture to local, state, national and international economies.
01.02	List occupations in aquaculture production, processing, distribution, marketing, and service.
01.03	Identify important aquatic species and products produced by aquatic farmers in Florida, U. S., and foreign countries.
01.04	List the types of production units and systems employed by aquaculturist in Florida, U. S. and foreign countries.
01.05	Outline basic techniques for constructing ponds, tanks, raceways, net pens and cages.
01.06	Describe basic production techniques for the culture of plants, mollusks, crustaceans, and finfish.
01.07	List and describe the major factors in growth of aquaculture species.
01.08	List important criteria in selecting a site for an aquaculture farm.
01.09	Describe natural fisheries and aquaculture production trends.
02.0	Perform general aquaculture production unit operations. The student will be able to:
02.01	Identify and describe the general anatomy, biology and life cycles for aquaculture species studied in this program.
02.02	Identify and describe the general morphology of aquatic macro and microalgae.
02.03	List methods to help determine aquatic animal health and behavior for various aquaculture production units.
02.04	List techniques for routine maintenance of aquaculture ponds, cage culture systems, and submerged lands.
02.05	Identify common aquaculture predators and list predator control techniques
02.06	Record production data such as water quality parameters, feed amounts, mortality and other routine information required for a specific operation on data sheets and enter into a computer.

03.0	Determine methods of fish identification. The student will be able to:
	03.01 Identify the major families of fish.
	03.02 Describe the complexities of fish anatomy for the following systems: • Skeletal systems • Musculature • Nervous system • Vascular system • Respiratory system • Urogenital system • Digestive system • Reproductive system
	03.03 Identify the major anatomical fish structures.
	03.04 Describe the physiological characteristics of fish for the following: • Color • Bioluminescence • Sound production • Sensory systems • Osmoregulation
	03.05 Classify fish.
	03.06 Describe the aquatic environment.
	03.07 Discuss the basics of fish behavior.
	03.08 Identify the muscles of a fish.
	03.09 Measure the physical characteristics of fish.
04.0	Demonstrate an understanding of water quality and aquaculture. The student will be able to:
	04.01 Define environmental variables and list ranges important for survival and growth of important aquaculture species.
	04.02 Demonstrate an understanding of aquifers, water quantity and management, and agricultural water use in Florida.
	04.03 Identify water quality measurements necessary for accurately culturing aquaculture organisms.
	04.04 Measure water quality parameters in aquaculture production units, record data in logs and computers, and interpret results.
	04.05 Describe the nitrogen cycle and identify system equipment and/or processes which reduce nitrogenous wastes.

04.06	Discuss the importance of oxygen to the maintenance of production units and aquatic animal health and the effect of temperature on oxygen concentration.
04.07	Describe processes in aquaculture production units that effect pH, alkalinity, carbon dioxide, oxygen, ammonia, and other environmental parameters.
04.08	Measure primary productivity and discuss its importance in various aquaculture production units.
04.09	Calculate water volumes for various sizes of aquaculture production units.
04.10	List potential sources of aquaculture pollution and describe methods of preventing or abating these problems.
04.11	Identify Best Management Practices for treating waste water from various aquaculture production units.
05.0	Maintain optimal nutrition for aquaculture organisms. The student will be able to:
05.01	Explain the digestive anatomy of fish.
05.02	Explain fish metabolic rates.
05.03	Identify fish food additives.
05.04	Outline the basic concepts of nutrition for plants, mollusks, crustaceans, and fish.
05.05	Discuss the importance of nutrition to growth and survival of various aquaculture species.
05.06	Identify feeding habits and practices of a variety of aquaculture species.
05.07	List common ingredients and additives of aquatic feeds and identify practices in feeds formulation and manufacturing.
05.08	Demonstrate an ability to culture live feeds including microalgae, rotifers and artemia and discuss their importance.
05.09	Calculate feeding rates, growth and feed conversion ratios for various aquaculture species stocked at different densities and rates.
05.10	List different feeding methods, measure feed and maintain feed records in logs and computers.
05.11	Discuss and differentiate feeding practices for hatchery, nursery and grow out of mollusks.
05.12	Discuss nutrition practices for culturing aquatic plants.
05.13	Discuss the principles of bioenergetics to growth.
06.0	Diagnose and control common aquaculture maladies. The student will be able to:
06.01	Identify the common diseases that infect aquaculture organisms.

	06.02 Understand the basic mechanisms for control of disease.
	06.03 Identify common bacterial diseases and treatment options.
	06.04 Identify common mycotic diseases and treatment options.
	06.05 Identify common viral diseases and treatment options.
	06.06 Identify common parasitic diseases and treatment options.
	06.07 Discuss the relationship of nutrition, water quality and stress how they may cause disease in aquaculture organisms.
	06.08 Prepare an aquatic organism for diagnostic examination or shipment.
	06.09 Observe various diseases of aquatic organisms and demonstrate use of a microscope.
	06.10 List approved drugs available for use in aquaculture.
	06.11 Describe approved chemicals and their use in treating diseases.
	06.12 Identify common aquatic parasites found in Florida waters.
	06.13 Identify toxic environmental diseases in fish.
07.0	Operate and maintain aquaculture equipment. The student will be able to:
	07.01 List equipment used in various production units necessary to raise plants, mollusks, crustaceans, and fish.
	07.02 Set up and maintain standard aquaria.
	07.03 Discuss the set-up of field aquaculture ponds.
	07.04 Measure field parameters such as temperature, salinity, and hardness.
	07.05 Set up a system to culture aquatic plants.
	07.06 Demonstrate an ability to correctly use aquaculture equipment including, but not limited to, a thermometer, oxygen meter, refractometer, pH meter, pump, graduated cylinder, beaker, nets, siphon, scales, sieves, calipers, secchi disk, and a microscope.
	07.07 Set up aquaculture filtration systems.
	07.08 List equipment options of a recirculating system including solids removal, biofiltration, sterilization and aeration, and explain their basic functions.
	07.09 Operate and perform system maintenance on a recirculating system.

07.10	Estimate pumping requirements and select an appropriately sized pump for a given system and water volume.
07.11	Layout a PVC plumbing scheme for a given aquaculture system with a sufficient number of valves to allow for bypass and isolation and then measure, cut and assemble that water system.
07.12	Layout and put together an aeration system operated on airlift technology.
07.13	Replace and install a pump.
07.14	Perform simple calculations related to water volume, water flow and system loading.
07.15	Use and operate tools and equipment safely.
07.16	Measure productivity in aquaculture systems.
08.0	Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms. The student will be able to:
08.01	Describe the reproductive anatomy, function of reproductive organs, and reproductive cycles of selected aquaculture organisms.
08.02	Differentiate between males and females of the same species.
08.03	Relate environmental factors to successful reproduction of various aquaculture species.
08.04	Explain the use of hormones, anesthetics, chemicals, antibiotics, and other techniques to manage broodstock and accelerate reproductive cycles and contrast the difference between environmental conditioning and induced spawning techniques.
08.05	Maintain and care for broodstock and prepare spawning tanks and/or systems.
08.06	Describe maturation, spawning, hatching, and larval rearing techniques for selected aquaculture species.
08.07	Discuss the importance of nutrition at various stages of the larval rearing cycle for selected aquaculture species.
08.08	Use a microscope to examine the stages and condition of eggs and larvae.
08.09	Prepare, stock, feed and maintain larval rearing tanks.
08.10	Culture live feeds and calculate feeding rates.
08.11	Outline a maturation system design for selected aquatic species.
08.12	List important practices and tasks in hatchery management.
08.13	Estimate production numbers from a given spawn of a given species.
08.14	Record hatching date in logs and computers and interpret results.

09.0	Perform general aquaculture nursery systems operations. The student will be able to:
09.01	Maintain, clean and operate a broodstock tank and list important practices in managing broodstock.
09.02	Start, maintain, count and harvest live feeds.
09.03	Maintain a nursery system by demonstrating an ability to clean tanks and filtration equipment, adjust water flow and volume, set aeration, and monitor water quality and feeding levels.
09.04	Describe and differentiate between land-based and field-based nursery systems, equipment, and operations.
09.05	Monitor and record routine data such as feed amounts and times, temperature, oxygen, salinity, and ammonia and enter data into a computer or log book.
09.06	List and describe nursery production systems and larval husbandry techniques for fish, crustaceans, and mollusks.
09.07	Demonstrate practical hands-on experience in handling a variety of juvenile aquaculture organisms and operating nursery production units.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Tropical Ornamental Mariculture Technician**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101030304
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Marine Environmental Technology AS degree program (1103060101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in tropical marine ornamental finfish and invertebrate husbandry, disease and parasite diagnostics and prevention, nutrition of marine aquaculture organisms, aquaculture best management practices, marine aquaculture systems and design, as well as an internship at a tropical marine aquaculture facility.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Compose scientific and/or technical reports.
02.0 Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation.
03.0 Comprehension of fundamental principles governing business and entrepreneurship.
04.0 Demonstrate an understanding of the fundamental principles of marine aquaculture.
05.0 Demonstrate a thorough knowledge of aquaculture best management practices including mitigating environmental impacts.
06.0 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.
07.0 Identify and diagnose common diseases and parasites that infect marine aquaculture organisms.
08.0 Demonstrate a moderate understanding of marine aquaculture systems.
09.0 Recognize appropriate nutritional requirements for the most common marine aquaculture organisms.

Florida Department of Education
Student Performance Standards

Program Title: **Tropical Ornamental Mariculture Technician**
CIP Number: **0101030304**
Program Length: **30 credit hours**

This certificate program is part of the Marine Environmental Technology AS degree program (1103060101). At the completion of this program, the student will be able to:	
01.0	Compose scientific and/or technical reports. The student will be able to:
01.01	List the typical components of a peer-reviewed scientific article
01.02	Explain the peer-review process of publishing a scientific article.
01.03	Explain the function of each section of a scientific paper, presentation, or technical report.
01.04	Critically analyze a scientific paper describing its thesis, methods, results, and conclusions.
01.05	Create at least one report and presentation formatted according to a scientific publishing format.
02.0	Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation. The student will be able to:
02.01	Explain the essential components of ecology, and how energy flows through an ecosystem.
02.02	Explain the functional role of primary producers in the marine environment and identify common species of marine plants and algae.
02.03	Explain the essential components of intertidal ecology, and how energy flows through various types of intertidal ecosystems.
02.04	Describe the features and functional systems in the intertidal, neritic, epipelagic, and deep ocean regions.
02.05	Explain the basic functional ecology and energy flow on a coral reef.
02.06	List the various resources humans derived from the sea and what problems this presents.
02.07	Explain how humankind has and continues to impact the marine environment.
02.08	Describe methods and best practices currently in use to conserve marine ecosystems including but not limited to as marine spatial planning, integrated coastal zone management and marine protected areas.
02.09	Explain the concepts of “Tragedy of the Commons” and “Precautionary Principle” as they relate to marine ecosystem and resource conservation.
03.0	Comprehension of fundamental principles governing business and entrepreneurship. The student will be able to:

	03.01 Demonstrate a familiarity of entrepreneurship by understanding the characteristics and mindset of entrepreneurs.
	03.02 Identify and evaluate opportunities within the marketplace, both for new venture creation and within existing organizations.
	03.03 Create the tools necessary to act on an entrepreneurial opportunity by writing a business plan, building a management team, financing the opportunity and creating an innovative marketing plan.
	03.04 Describe successful strategies and common mistakes made by successful entrepreneurs.
	03.05 Describe the legal requirements and obstacles in starting a business venture.
04.0	Demonstrate an understanding of the fundamental principles of marine aquaculture. The student will be able to:
	04.01 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.
	04.02 Demonstrate the skills required to culture phytoplankton and zooplankton required for larval rearing.
	04.03 Describe the basic types of marine aquaculture systems.
	04.04 Describe the various types of common organisms and techniques currently used during marine aquaculture operations.
	04.05 Demonstrate a basic knowledge of common diseases and parasites during marine aquaculture and methods for their control.
05.0	Demonstrate a thorough knowledge of aquaculture best management practices including mitigating environmental impacts. The student will be able to:
	05.01 Describe the concept of aquaculture Best Management Practices.
	05.02 Compile and analyze marine aquaculture industry management data (e.g., water quality parameters, economic data).
	05.03 Identify and demonstrate proper use of key Quality Management tools.
	05.04 Develop and implement the key components and concepts of an aquaculture management plan.
	05.05 Identify potential environmental impacts and measures to mitigate them.
06.0	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices. The student will be able to:
	06.01 Identify the principles of water quality specific to marine aquaculture for a variety of marine taxa.
	06.02 Demonstrate a working knowledge of variety of husbandry techniques for most of the known marine species currently being cultured, including temperature and photoperiod control conducive to spawning and species specific life styles.
	06.03 Understand basic selective breeding techniques for enhanced phenotypic traits.
07.0	Identify and diagnose common diseases and parasites that infect marine aquaculture organisms. The student will be able to:

	07.01	Demonstrate an understanding of the basic principles of disease in marine aquatic systems.
	07.02	Identify the differences between environmental, viral, bacterial, parasitic, and fungal diseases of marine species.
	07.03	Demonstrate a basic understanding of methodologies for treatment of diseases commonly encountered during marine aquaculture operations.
	07.04	Demonstrate an understanding of the basic principles of marine aquatic health management and biosecurity.
08.0	Demonstrate a moderate understanding of marine aquaculture systems and design. The students will be able to:	
	08.01	Describe the various types of marine aquaculture systems and demonstrate the ability to distinguish the primary components of specific marine aquaculture systems.
	08.02	Identify which systems are best for the culture and business model of the target species.
	08.03	Recognize the system requirements for Integrated Multi-Trophic Mariculture (IMTM) systems.
	08.04	Demonstrate an understanding of the impacts of specific marine aquaculture systems on the environment and especially marine ecosystems.
	08.05	Demonstrate basic skills for computer automated drafting.
09.0	Recognize appropriate nutritional requirements for the most common marine aquaculture organisms. The student will be able to:	
	09.01	Recognize basic marine nutrient and biochemical energy fluxes (i.e., trophodynamics and bioenergetics) especially as they relate to species commonly associated with marine aquaculture.
	09.02	Demonstrate a rudimentary understanding of biochemistry (e.g., proteins, lipids, carbohydrates, etc.) and nutrient metabolism in common marine aquaculture species.
	09.03	Demonstrate an understanding of the metabolic role of vitamins and minerals and recognize symptoms of vitamin deficiency.
	09.04	Recognize appropriate feeding management practices based on metabolic requirements of marine aquaculture target species.
	09.05	Recognize the impacts of feeding strategies on the environment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Marine Mammal Behavior and Training**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101050501
Program Type	College Credit Certificate (CCC)
Program Length	15 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose
This certificate program is part of the Marine Environmental Technology AS degree program (1103060101).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The purpose of this program is to provide technically skilled employees for the marine mammal training, behavior, and research fields. Graduates of this program will obtain the fundamental academic skills necessary to be successful at entry level positions in the marine mammal training, behavior and research fields and demonstrate an understanding of the fundamental concepts of marine mammal science.

Graduates will demonstrate the ability to understand and practice the fundamentals of: marine mammal husbandry; marine mammal medical care and pathology; behavior modification and training; anatomy; physiology; maternity; population management; habitat and maintenance; environmental enrichment; cognitive and behavioral research methodology, design and implementation; dolphin acoustics; and communication; marine mammal law; and conservation.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution.
02.0 Demonstrate basic knowledge of marine mammal social structure and culture.
03.0 Demonstrate proficiency of basic marine mammal training and husbandry techniques.
04.0 Demonstrate knowledge of principle marine mammal laws and regulations.
05.0 Describe and discuss research focused on marine mammals.
06.0 Demonstrate knowledge of conservation issues involving marine mammals.
07.0 Demonstrate an understanding of the guiding principles and practices of marine mammals in human care.
08.0 Implement the skills and knowledge to interpret a live animal presentation for an audience.
09.0 Conduct an informal presentation on social structure, behavior, learning, and conservation threats.
10.0 Effectively connect an audience to a live marine mammal to influence personal conservation behavior.

Florida Department of Education
Student Performance Standards

Program Title: **Marine Mammal Behavior and Training**
CIP Number: **0101050501**
Program length: **15 credit hours**

This certificate program is part of the Marine Environmental Technology AS degree program (1103060101). At the completion of this program, The student will be able to:	
01.0	Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution. The student will be able to:
01.01	Demonstrate an understanding of the external and internal aspects of dolphin anatomy and physiology, and their role in the successful survival of a mammal in the marine environment.
01.02	Demonstrate knowledge of the anatomy and evolution of various marine mammals including other cetaceans, pinnipeds and sirenians.
01.03	Demonstrate knowledge of the evolution of marine mammals.
02.0	Demonstrate basic knowledge of marine mammal social structure and culture. The student will be able to:
02.01	Demonstrate an understanding of basic dolphin or other marine mammal ecology as related to communication, foraging, reproduction, calf rearing, and social structure.
02.02	Explain and outline marine mammal maternal characteristics, behaviorism human care and the wild, as well as prenatal care, birthing situations and maternity care of mother and neonate human care facilities.
02.03	Explain the natural social ecology of dolphins or other marine mammals and the importance and impact of it on how they are managed at a human care facility.
02.04	Demonstrate an understanding of the basic social structure of other representative marine mammal taxa.
02.05	Demonstrate how the term “culture” has been theorized to apply to certain aspects of cetacean societies and how that impacts our understanding of their cognition.
02.06	Understand the portrayal of marine mammals in the media and how and why it has changed over time.
02.07	Understand the application of animal assistance to humans throughout history and the more recent use of marine mammals in military service and how the latter has greatly contributed to our essential knowledge base of marine mammals overall.
03.0	Demonstrate proficiency of basic marine mammal training and husbandry techniques. The student will be able to:
03.01	Understand the philosophy and techniques of operant (behavioral) conditioning, with a focus on positive reinforcement and relationship-based training, in training behavior and its application to working with dolphins or other marine mammals.
03.02	Demonstrate operant conditioning techniques through the use of learned hand signals in communicating requests for various trained behaviors from the dolphin or other marine mammal.
03.03	Apply skills learned in animal care, handling and reinforcement during a live animal presentation for the general public.

03.04	Construct a plan for basic marine mammal care, dietary and medical needs, and animal handling.
03.05	Understand the medical issues unique to marine mammals, methods of treatment of bacterial, viral, fungal and parasitic disease, established preventive care practices.
03.06	Demonstrate the use of operant conditioning in training a new behavior through outlining, developing, implementing and modifying a behavior chain through practical application with the animals.
03.07	To summarize the importance of voluntary medical behavior training, concepts and techniques used to desensitize animals to non-invasive medical equipment and procedures. Understand the importance of the trainer/animal relationship with regard to properly maintaining the health and well being of the animals.
03.08	To investigate and understand the purpose and necessity of animal enrichment including cognitive, development, and social aspects. Design and implement enrichment activities to enhance the habitat and activities of the animals.
03.09	To summarize safety precautions and the social issues surrounding enrichment devices, habitat design, safety, maintenance, social groupings, nutrition, training, and energetics of dolphins or other marine mammals.
03.10	To critique various career pathways and opportunities available in the field of marine mammal care and training, including necessary academics, field experience, trainer forums, further experiential education in the field, networking, etc.
04.0	Demonstrate knowledge of principle marine mammal laws and regulations. The student will be able to:
04.01	Understand and explain the laws and regulating agencies, and their evolution, designed to protect marine mammals in both the wild and human care as well as regulate facilities.
04.02	Understand the separate roles of both NOAA and the Department of Agriculture and how they impact marine mammals and marine mammal facilities.
05.0	Describe and discuss research focused on marine mammals. The student will be able to:
05.01	Describe the historical and current research efforts relating to dolphin or other marine mammal cognition, behavior, acoustics, communication, strandings, physiology, reproduction, and conservation.
05.02	Summarize basic medical procedures and the importance and implications of husbandry techniques to marine mammal research.
05.03	Explain how research with dolphins or other marine mammals in human care have expanded our understanding of their wild cousins and contributed to their conservation.
05.04	Summarize trends in basic dolphin or other marine mammal ethology, past and ongoing studies related to cognition, behavior and communication and its application in research, as well as an understanding of passive observational data collection and facilitation of active cognitive research.
05.05	Evaluate theories and research on echolocation and whistle production; implication of anthropogenic noise in the marine environment and ongoing research in the area.
05.06	Conduct independent behavioral observations.
05.07	Review research design and logistics as it applies to marine mammals in human care through a project design exercise conducted collaboratively throughout the course, including an understanding of results analyses and interpretation.
05.08	Critique career pathways and requirements toward becoming a marine mammal research scientist in human care settings (*ex situ*) and in the field (*in situ*).

06.0	Demonstrate knowledge of conservation issues involving marine mammals. The student will be able to:	
	06.01	Understand the current conservation issues of international/domestic concern which affect marine mammals and their environment, cumulative impacts both natural and human induced, as well as ways in which individuals can affect the environment in a positive manner to conserve the species.
	06.02	Master the skills in synthesizing new information and experiences with prior conceptions of dolphins or other marine mammals and the marine environment to clearly refine their opinions and knowledge base.
	06.03	Outline the organization of the Marine Mammal Stranding Network; procedures used in assisting and rehabilitating stranded marine mammals; international and domestic issues concerning threats to dolphins or other marine mammals and the marine environment.
	06.04	List anthropogenic effects on marine mammals and their environment, and demonstrate an understanding of research needed in this area, implications of impacts and associated research.
	06.05	Understand past and present state of whaling operations around the world and the processes and organizations that govern these activities.
	06.06	Understand status of certain endangered marine mammal species and conservation measures to sustain their populations.
07.0	Demonstrate an understanding of the guiding principles and practices of marine mammals in human care. The student will be able to:	
	07.01	To diagram population management, including theories, tools and strategies for maintaining a population's genetic diversity and demographic stability in order to ensure its long-term persistence.
	07.02	Summarize specific concerns surrounding appropriate design, construction, and maintenance of aquatic mammal habitats for marine mammals in human care.
08.0	Implement the skills and knowledge to interpret a live animal presentation for an audience. The student will be able to:	
	08.01	Explain in detail what makes an effective live animal presentation.
	08.02	Effectively assess audience demographics and adapt to their needs.
	08.03	Effectively read, understand, and generate the audience's interest.
	08.04	Clearly interpret animal behavior for a live audience.
09.0	Conduct an informal presentation on social structure, behavior, learning, and conservation threats. The student will be able to:	
	09.01	Effectively assess audience demographics and adapt to their needs.
	09.02	Effectively read, understand, and generate the audience's interest.
	09.03	Appropriately select educational information.
10.0	Effectively connect an audience to a live marine mammal to influence personal conservation behavior. The student will be able to:	
	10.01	Connect to the audience and maintain their attention.

10.02	Communicate interesting aspects of the animal's personality and unique qualities to enable audience members to personally relate to the animal.
10.03	Suggest simple personal solutions that lead to conservation behavior (e.g., refusing single-use plastics, obeying the US Marine Mammal Protection Act, etc.) that positively impacts the marine environment.

Additional Information

Laboratory Activities

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Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **Equine Assistant Management**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101050701
Program Type	College Credit Certificate (CCC)
Program Length	24 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Equine Studies AS degree program (1101050701).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the equine industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction to individuals in the areas of planning, organizing, and supervising equine operations with emphasis on the science and care of equine species and the knowledge and understanding necessary for managing equine operations.

The Equine Assistant Management College Credit Certificate should include the requirements specified in the statewide Articulation Manual.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify veterinary terminology and illustrate equine health practices.
02.0 Analyze equine nutrient requirements and evaluate equine diets.
03.0 Evaluate equine management systems for appropriate animal welfare, including housing, care, and regulations.
04.0 Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work-based learning activities and a portfolio.
05.0 Demonstrate techniques in evaluation, selection, and breeding of horses.
06.0 Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems.
07.0 Demonstrate leadership and effective communication in employee management.

Florida Department of Education
Student Performance Standards

Program Title: **Equine Assistant Management**
CIP Number: **0101050701**
Program Length: **24 credit hours**

This certificate program is part of the Equine Studies AS degree program (1101050701). At the completion of this program, the student will be able to:	
01.0	Identify veterinary terminology and illustrate equine health practices. The student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions
02.0	Analyze equine nutrient requirements and evaluate equine diets. The student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, lactating).
02.02	Determine economic impact of feedstuff purchasing decisions
02.03	Maintain safe feeding management programs for enhanced equine health
02.04	Prepare a typical diet for horses of different classes
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Evaluate equine management systems for appropriate animal welfare, including housing, care, and regulations. The student will be able to:
03.01	Describe housing designs for different equine management systems.
03.02	Identify appropriate levels of care and welfare for equines.
03.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.

04.0	Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work-based learning activities and a portfolio. The student will be able to:
	04.01 Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
	04.02 Demonstrate ability to work as part of a team.
	04.03 Conduct a job search, write a resume, and practice interview techniques.
	04.04 Understand legal requirements for employees including hiring, firing, and documentation.
	04.05 Develop managerial skills such as mentoring, management by objectives, balanced feedback, critical appraisal, and promotion.
05.0	Demonstrate techniques in evaluation, selection, and breeding of horses. The student will be able to:
	05.01 Evaluate equine conformation according to use and purpose.
	05.02 Understand basic genetics and selection techniques for effective animal breeding.
	05.03 Show ability to manage reproductive health and efficiency.
	05.04 Develop appropriate management techniques for equine breeding farm, including stallion management, estrus detection, breeding, foaling and foal management.
06.0	Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems. The student will be able to:
	06.01 Maintain and analyze equine records and basic business records (health, breeding, inventory, equipment, purchases, and depreciation).
	06.02 Understand contract language and different types of contracts.
	06.03 Maintain machinery, equipment, and facility inventory records.
	06.04 Understand legal requirements, rules and regulations concerning horses and agribusiness.
	06.05 Manage farm inventory (horses, feed, equipment) for optimum efficiency and profitability.
07.0	Demonstrate leadership and effective communication in employee management. The student will be able to:
	07.01 Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
	07.02 Select and hire farm managers who will work with various levels of farm workers, work well in a team environment and care about equine.
	07.03 Develop effective oral and written communication skills.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **Equine Technician**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101050703
Program Type	College Credit Certificate (15 credits)
Program Length	15 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Equine Studies AS degree program (1101050701).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the equine industry within the Agriculture, Food and Natural Resources career cluster.

The Equine Technician**,** a 15-credit hour college certificate program, introduces students to equine care and entry-level employment. The content includes but is not limited to instruction to individuals in the area of basic equine care. The program includes the requirements specified in the statewide Articulation Manual.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify veterinary terminology and illustrate equine health practices.
02.0 Analyze equine nutrient requirements and evaluate equine diets.
03.0 Identify, analyze, and apply basic concepts related to normal and abnormal equine behaviors.
04.0 Perform safe horse handling techniques.
05.0 Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations.

Florida Department of Education
Student Performance Standards

Program Title: **Equine Technician**
CIP Numbers: **0101050703**
Program Length: **15 credit hours**

This certificate program is part of the Equine Studies AS degree program (1101050701). At the completion of this program, the student will be able to:	
01.0	Identify veterinary terminology and illustrate equine health practices. The student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts.
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions.
02.0	Analyze equine nutrient requirements and evaluate equine diets. The student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, and lactating).
02.02	Determine economic impact of feedstuff purchasing decisions.
02.03	Maintain safe feeding management programs for enhanced equine health.
02.04	Prepare a typical diet for horses of different classes.
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Identify, analyze, and apply basic concepts related to normal and abnormal equine behaviors. The student will be able to:
03.01	Understand and recognize natural horse behaviors.
03.02	Identify and resolve abnormal equine behaviors.
03.03	Utilize horse learning behaviors to improve management and safe handling of horses.

04.0	Perform safe horse handling techniques. The student will be able to:
04.01	Safely catch, lead, tie, groom, restrain and work around horses of various levels of training.
04.02	Safely administer health and medical practices, such as leg wraps, vital signs, injections, and restraint for such treatments.
04.03	Evaluate safe transportation techniques and equipment for transportation.
04.04	Evaluate training equipment and demonstrate application of training equipment.
05.0	Evaluate equine management systems for appropriate animal welfare, including housing, care and regulations. The student will be able to:
05.01	Describe housing designs for different equine management systems.
05.02	Identify appropriate levels of care and welfare for equines.
05.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Landscape and Horticulture Specialist**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101060503
Program Type	College Credit Certificate (CCC)
Program Length	12 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant classification and identification, maintenance of landscape plants and employability and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of plant physiology and growth.
02.0 Classify plants.
03.0 Maintain landscape plants.
04.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Landscape and Horticulture Specialist**
CIP Number: **0101060503**
Program Length: **12 credit hours**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060503). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants. The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Maintain landscape plants. The student will be able to:
03.01	Determine water requirements and apply at proper rates.
03.02	Identify weeds and apply herbicides safely.
03.03	Determine fertilization requirements and apply at proper rates.
03.04	Identify plant pest problems and apply corrective measures.

	03.05 Regulate the growth of landscape plants through chemical or mechanical needs.
	03.06 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
04.0	Demonstrate employability skills. The student will be able to:
	04.01 Conduct a job search.
	04.02 Secure information about a job.
	04.03 Identify documents that may be required when applying for a job.
	04.04 Create a resume and cover letter.
	04.05 Demonstrate competency in job interview techniques.
	04.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
	04.07 Identify acceptable work habits.
	04.08 Demonstrate knowledge of how to make job changes.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to

Accommodations

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Florida Department of Education
Curriculum Framework

Program Title: **Landscape and Horticulture Professional**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101060504
Program Type	College Credit Certificate (CCC)
Program Length	18 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to, instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, pest control, pruning and shaping plants, maintenance of landscape plants and employability and human relations skills. This program also prepares for certification and licensure as horticulture professional.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of plant physiology and growth.
02.0 Classify plants.
03.0 Fertilize plants.
04.0 Manage a pest-control program.
05.0 Prune and shape plants.
06.0 Demonstrate employability skills.
07.0 Maintain landscape plants.

Florida Department of Education
Student Performance Standards

Program Title: **Landscape and Horticulture Professional**
CIP Number: **0101060504**
Program Length: **18 credit hours**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants. The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Fertilize plants. The student will be able to:
03.01	Evaluate influences of nutrients on plant growth.
03.02	Identify appropriate methods of fertilizer application (dry, liquid, slow-release, injection, etc.).
03.03	Demonstrate proper handling and storage of fertilizers, observing safety precautions.
04.0	Manage a pest-control program. The student will be able to:

	04.01 Develop an integrated pest management program or schedule.
	04.02 Train employees in the safe use of pesticides.
05.0	Prune and shape plants. The student will be able to:
	05.01 Train employees in pruning techniques.
	05.02 Identify tools for pruning.
	05.03 Identify proper pruning techniques and how this effects plant growth.
	05.04 Demonstrate sanitation and safety practices when pruning.
06.0	Demonstrate employability skills. The student will be able to:
	06.01 Conduct a job search.
	06.02 Secure information about a job.
	06.03 Identify documents that may be required when applying for a job.
	06.04 Create a resume and cover letter.
	06.05 Demonstrate competency in job interview techniques.
	06.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
	06.07 Identify acceptable work habits.
	06.08 Demonstrate knowledge of how to make job changes.
07.0	Maintain landscape plants. The student will be able to:
	07.01 Determine water requirements at proper rates.
	07.02 Identify weeds and appropriate herbicide application.
	07.03 Determine fertilization requirements.
	07.04 Identify plant pest problems and apply corrective measures.
	07.05 Regulate the growth of landscape plants.
	07.06 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Landscape and Horticulture Technician**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0101060505
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the landscape and horticulture sector within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, pest control, pruning and shaping plants, maintenance of landscape plants, equipment maintenance, and employability and human relations skills. This program also prepares for certification and licensure as a horticulture professional and landscape technician.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.
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Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of plant physiology and growth.
02.0 Classify plants.
03.0 Select tools and equipment.
04.0 Fertilize plants.
05.0 Manage a pest-control program.
06.0 Prune and shape plants.
07.0 Maintain landscape plants.
08.0 Demonstrate employability skills.

Landscape Specialization
09.0 Plan and service landscape irrigation systems.
10.0 Analyze and organize the project.
11.0 Lay out and install landscape.

Horticulture Specialization
12.0 Determine drainage system needs and design a drainage system.
13.0 Maintain and analyze records.
14.0 Prepare growing media and seedbeds.
15.0 Propagate plants.
16.0 Grow plants.
17.0 Harvest, process, and ship plants.
18.0 Design nursery irrigation systems.

Florida Department of Education
Student Performance Standards

Program Title: **Landscape and Horticulture Technician**
CIP Number: **0101060505**
Program Length: **30 credit hours**

This certificate program is part of the Landscape and Horticulture Technology AS degree program (1101060502). At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants. The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Select tools and equipment. The student will be able to:
03.01	Select equipment for the job.
03.02	Maintain an inventory of parts and supplies.
04.0	Fertilize plants. The student will be able to:
04.01	Evaluate influences of nutrients on plant growth.

	04.02 Identify appropriate methods of fertilizer application (dry, liquid, slow-release, injection, etc.).
	04.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
05.0	Manage a pest-control program. The student will be able to:
	05.01 Develop an integrated pest management program or schedule.
	05.02 Train employees in the safe use of pesticides.
	05.03 Determine pesticide licensure requirements.
06.0	Prune and shape plants. The student will be able to:
	06.01 Train employees in pruning techniques.
	06.02 Identify tools for pruning.
	06.03 Prune plants to achieve desired growth.
	06.04 Demonstrate sanitation and safety practices when pruning.
	06.05 Develop a pruning program and time schedule
	06.06 Select plant growth regulators
07.0	Maintain landscape plants. The student will be able to:
	07.01 Determine water requirements at proper rates.
	07.02 Identify weeds and appropriate herbicide application.
	07.03 Determine fertilization requirements.
	07.04 Regulate growth of landscape plants.
	07.05 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
	07.06 Identify plant pest problems and apply corrective measures.
08.0	Demonstrate employability skills. The student will be able to:
	08.01 Conduct a job search.
	08.02 Secure information about a job.

	08.03 Identify documents that may be required when applying for a job.
	08.04 Create a resume and cover letter.
	08.05 Demonstrate competency in job interview techniques.
	08.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
	08.07 Identify acceptable work habits.
	08.08 Demonstrate knowledge of how to make job changes.
Landscape Specialization	
09.0	Plan and service landscape irrigation systems. The student will be able to:
	09.01 Determine irrigation requirements.
	09.02 Operate and service low-volume irrigation system.
	09.03 Operate and service overhead irrigation systems.
	09.04 Operate and maintain automatic system.
10.0	Analyze and organize the project. The student will be able to:
	10.01 Interpret plans and specifications.
	10.02 Identify safety requirements.
	10.03 Organize site preparation.
	10.04 Locate project materials.
11.0	Lay out and install landscape. The student will be able to:
	11.01 Identify procedures for site specific rough grading.
	11.02 Identify procedures for lay out and installation of plants.
	11.03 Identify procedures for preparing final grade.
	11.04 Identify procedures for lawn installation.
	11.05 Identify procedures for mulch installation.

	11.06 Identify procedures for preforming final clean up.
Horticulture Specialization	
12.0	Determine drainage system needs and design a drainage system. The student will be able to:
	12.01 Determine the texture and percolation characteristics of the soil.
13.0	Maintain and analyze records. The student will be able to:
	13.01 Maintain fertilizer and pesticide application records.
	13.02 Use computers in the landscape and horticulture operations.
14.0	Prepare growing media and seedbeds. The student will be able to:
	14.01 Identify media materials.
	14.02 Mix rooting and growing media according to plant requirements.
	14.03 Sterilize rooting, potting, and growing media.
	14.04 Collect and test a soil sample from field and potting media.
	14.05 Adjust pH and nutritional levels of media.
	14.06 Prepare planting beds and sites.
	14.07 Fill and level benches and pots with media.
	14.08 Demonstrate sanitation practices when handling and storing plant media materials.
15.0	Propagate plants. The student will be able to:
	15.01 Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
	15.02 Demonstrate propagation (grafting, budding, layering, separating, dividing, cutting, and tissue culturing, etc.).
	15.03 Prepare flats and a seedbed and plant seeds.
	15.04 Prepare a rooting bed.
	15.05 Prepare propagation materials (seeds, cuttings, scions, etc.)
	15.06 Apply growth stimulants to propagation materials.

	15.07 Transplant rooted propagation materials including tissue culture transplants.
	15.08 Demonstrate sanitation and safety practices when propagating.
16.0	Grow plants. The student will be able to:
	16.01 Prepare media for containers.
	16.02 Prepare field site for transplants.
	16.03 Select plant containers.
	16.04 Determine plant spacing in the field and on container beds.
	16.05 Transplant propagated materials to various containers and to the field.
	16.06 Determine and provide light requirements of various plant types.
17.0	Harvest, process, and ship plants. The student will be able to:
	17.01 Demonstrate an understanding of selecting, grading, and assembling container grown plants.
	17.02 Prepare for shipment, loading, and transporting harvested plant materials.
18.0	Design nursery irrigation systems. The student will be able to:
	18.01 Determine irrigation requirements.
	18.02 Assess quality of irrigation water.
	18.03 Operate various types of irrigation systems.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Veterinary Assisting**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0301830100
Program Type	College Credit Certificate (CCC)
Program Length	14 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Veterinary Technology AS (1301830100).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to animal office procedure; animal pharmacy; animal examination room/area; animal surgical preparation; large and small animal nursing; animal radiography, and employability skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Participate in facility management utilizing traditional and electronic media and appropriate veterinary medical terminology and abbreviations.
02.0 Communicate in a professional manner in all formats: written, oral, non-verbal, and electronic.
03.0 Follow and uphold applicable laws and the veterinary technology profession's ethical codes to provide high quality care to patients.
04.0 Safely and effectively administer prescribed drugs to patients.
05.0 Accurately dispense and explain prescribed drugs to clients.
06.0 Demonstrate and perform patient assessment techniques in a variety of animal species.
07.0 Understand and demonstrate husbandry, nutrition, therapeutic and dentistry techniques appropriate to various animal species.
08.0 Understand and integrate all aspects of patient management for common surgical procedures in a variety of animal species.
09.0 Understand and provide the appropriate instruments, supplies and environment to maintain asepsis during surgical procedures.
10.0 Safely and effectively produce diagnostic radiographic and non-radiographic images.

Florida Department of Education
Student Performance Standards

Program Title: **Veterinary Assisting**
CIP Number: **0301830100**
Program Length: **14 credit hours**

This certificate program is part of the Veterinary Technology AS degree program (1301830100). At the completion of this program, the student will be able to:	
01.0	Participate in facility management utilizing traditional and electronic media and appropriate veterinary medical terminology and abbreviations. The student will be able to:
01.01	Schedule appointments, admit, discharge and triage according to client, patient and facility needs through phone and in-person contact. • Recognize and respond to veterinary medical emergencies.
01.02	Create and maintain individual client records, vaccination certificates, and other appropriate forms: • develop computer skills. • be able to utilize veterinary practice management software. • be familiar with veterinary on-line services (e.g., laboratory submissions, client financing plans, continuing education, discussion groups).
01.03	Perform basic filing of medical records, radiographs, lab reports, etc.
01.04	Create and maintain all appropriate facility records and logs in compliance with regulatory guidelines (e.g., radiography, surgery, anesthesia, laboratory, controlled substance).
01.05	Manage inventory control.
01.06	Recognize roles of appropriate regulatory agencies.
01.07	Maintain appropriate disposal protocols for hazardous materials.
01.08	Establish and maintain appropriate sanitation and infection control protocols for a veterinary facility, including patient and laboratory area.
01.09	Handle daily client-based financial transactions.
02.0	Communicate in a professional manner in all formats: written, oral, non-verbal, and electronic. The student will be able to:
02.01	Demonstrate an understanding of interpersonal skills and team dynamics*.
02.02	Utilize appropriate interpersonal and public relations skills*.
02.03	Demonstrate telephone etiquette* (e.g., through role playing, educational resources, etc.).

	02.04 Recognize the legality of the veterinary-client-patient relationship*.
	02.05 Develop and provide client education in a clear and accurate manner at a level the client understands (i.e., oral and written form, including educational handouts)*.
	02.06 Apply crisis intervention/grief management skills with clients*.
03.0	Follow and uphold applicable laws and the veterinary technology profession's ethical codes to provide high quality care to patients. The student will be able to:
	03.01 Understand and observe legal boundaries of veterinary health care team members.
	03.02 Interact professionally with clients and fellow staff members.
	03.03 Demonstrate a commitment to high quality patient care.
	03.04 Respect and protect the confidentiality of client and patient information.
04.0	Safely and effectively administer prescribed drugs to patients. The student will be able to:
	04.01 Recognize the safe and effective manner in which vaccines must be administered; recognize and explain common side effects.
	04.02 Demonstrate the ability to accurately record medical information.
	04.03 Demonstrate understanding of controlled substance regulations.
	04.04 Demonstrate compliance with all federal regulatory guidelines for drug purchase, storage, administration, withdrawal, dispensing, disposal, and inventory control (e.g., biologics and therapeutic agents, pesticides, and hazardous wastes).
05.0	Accurately dispense and explain prescribed drugs to clients. The student will be able to:
	05.01 Demonstrate understanding of regulations governing maintenance of controlled substances log book.
	05.02 Demonstrate compliance with all federal regulatory guidelines for drug purchase, storage, administration, withdrawal, dispensing, disposal and inventory control (e.g., biologics and therapeutic agents, pesticides and hazardous wastes).
06.0	Demonstrate and perform patient assessment techniques in a variety of animal species. The student will be able to:
	06.01 Recognize common domestic animal species and breeds.
	06.02 Describe and use common animal identification methods.
	06.03 Demonstrate effective and appropriate restraint techniques for various animal species: • Properly restrain dogs and cats for procedures. • Encage and remove small animals from cages. • Apply dog muzzle safely. • Apply Elizabethan collar.

	• Use restraint pole and other restraint aids.
	• Halter, tie, and lead horses.
	• Restrain birds.
	• Restrain pocket pets and exotics.
	• Restrain cattle and horses.
	  ○ Apply twitch (horses).
	  ○ Apply bovine tail restraint.
	  ○ Apply bovine halter.
	• Restrain sheep and pigs.
	• Load large animals.
	• Safely operate cattle chute.

	06.04 Demonstrate the ability to obtain objective patient data: • Temperature (dog, cat, horse cow) • Pulse (dog cat, horse cow) • Respiration (dog, cat, horse, cow) • Auscultate heart/lungs (dog, cat, horse, cow) • Assess hydration status.
07.0	Understand and demonstrate husbandry, nutrition, therapeutic and dentistry techniques appropriate to various animal species. The student will be able to:
	07.01 Grooming: • Demonstrate understanding of therapeutic bathing, basic grooming, and dipping of small animals. • Trim nails (dog, cat). • Trim hooves (ruminant, horse). • Apply equine tail and leg wraps. • Express canine anal sacs. • Clean and medicate ears (dog, cat). • Clean sheath (horse).
	07.02 Perform microchip scanning and implantation.
	07.03 Environmental conditions: implement sanitation procedures for animal holding and housing areas.
	07.04 Demonstrate understanding of permanent identification.
	07.05 Understand life stage energy and nutrient requirements of well animals (dog, cat, horse, cow).
08.0	Understand and integrate all aspects of patient management for common surgical procedures in a variety of animal species. The student will be able to. The student will be able to:
	08.01 Properly identify patients and surgical procedures.

	08.02 Prepare surgical site using appropriate aseptic techniques.
	08.03 Position patient for common procedures.
09.0	Understand and provide the appropriate instruments, supplies and environment to maintain asepsis during surgical procedures. The student will be able to:
	09.01 Prepare surgical instruments and supplies.
	09.02 Prepare gowns, masks, gloves, and drapes.
	09.03 Operate and maintain autoclaves.
	09.04 Sterilize instruments and supplies using appropriate methods.
	09.05 Perform pre-surgical set-up.
	09.06 Provide operating room sanitation and care.
	09.07 Maintain proper operating room conduct and asepsis.
	09.08 Perform post-surgical clean-up (e.g., equipment, instruments, room, proper disposal of hazardous medical waste).
10.0	Safely and effectively produce diagnostic radiographic and non-radiographic images. The student will be able to:
	10.01 Implement and observe recommended radiation safety measures.
	10.02 Properly utilize radiographic technique charts.
	10.03 Position live animals and produce diagnostic radiographic images (dogs*, cats*, horses*, and birds).
	10.04 Appropriately label, file, and store images.
	10.05 Demonstrate an understanding of completing a radiographic log for systems, reports, files, and records.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

These skills are transferable to an Associate of Science (AS) degree in Veterinary Technology.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Hazardous Materials Specialist**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0703010403
Program Type	College Credit Certificate (CCC)
Program Length	14 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Environmental Science Technology AS degree program (1703010401).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to analysis, handling, storage, and dispensing of hazardous materials in accordance with appropriate federal, state, and local laws and regulations governing proper chemical management. The certificate will cover industry standards such as those included in the Occupational Health and Safety Administration (OSHA) 29CFR1910.120 **Hazardous Waste Operations and Emergency Response** (HAZWOPER) Standard, the Oil Pollution Act of 1990, the Clean Air Act, the Clean Water Act, and the Department of Transportation (DOT) regulations. Graduates of this certificate program should be able to research applicable local, state, and federal regulations and implement methods and strategies to ensure compliance; to maintain records as required by OSHA, the Environmental Protection Agency (EPA), and the DOT; to develop and implement hazardous materials handling procedures; to plan for emergency response to hazardous materials incidents; and to protect employees/workers/communities from hazardous material exposures.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge of the principles of managing water pollution through prevention and remediation
02.0 Demonstrate knowledge of the principles of managing air pollution through prevention and remediation
03.0 Demonstrate awareness of environmental noise sources and their monitoring.
04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
05.0 Sample, analyze and calculate data related to air, water, and soil pollutants.
06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
07.0 Demonstrate and awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
08.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Hazardous Materials Specialist**
CIP Number: **0703010403**
Program Length: **14 credit hours**

This certificate program is part of the Environmental Science Technology AS degree program (1703010401). At the completion of this program, the student will be able to:	
01.0	Demonstrate knowledge of the principles of managing water pollution through prevention and remediation. The student will be able to:
01.01	Determine chemical and physical properties of surface water and groundwater.
01.02	Describe microbial systems related to water pollution.
01.03	Describe surface water, groundwater systems, hydrologic cycle, potable water and wastewater treatment processes.
01.04	Identify types and sources of surface water and groundwater contamination.
01.05	Collect water samples for field and laboratory analysis.
01.06	Identify the water quality standards for effluent from domestic and various industrial wastewater facilities.
01.07	Describe ambient water quality criteria.
01.08	Demonstrate the technology and methods applied to non-point source pollution control (stormwater and agriculture runoff).
02.0	Demonstrate knowledge of the principles of managing and remediation of air pollution. The student will be able to
02.01	Collect and analyze ambient and process air samples.
02.02	Measure air pollutants from a specific source.
02.03	Record, interpret, and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring. The student will be able to:
03.01	Define and discuss the physical properties of sound.
03.02	Discuss the threshold of hearing, tolerance, and hearing loss.
03.03	Discuss environmental noise, its effect on humans, and solutions to noise pollution.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants. The student will be able to:

	04.01 Demonstrate knowledge of basic laboratory operation.
	04.02 Operate and calibrate selected laboratory instruments.
	04.03 Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze, and calculate data related to air, water and soil pollutants. The student will be able to:
	05.01 Gather and analyze selected samples.
	05.02 Manipulate data and reach confident conclusions.
	05.03 Write formal technical reports.
	05.04 Identify and perform the correct analysis for selected air pollutants listed with state and federal regulations.
	05.05 Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent, surface water and groundwater.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control. The student will be able to:
	06.01 Discuss nuclear power plant design, nuclear power hazards, and safety features.
	06.02 Discuss nuclear fuel reprocessing and storage and waste disposal.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems. The student will be able to:
	07.01 Discuss the composition, sources, and quantity of solid waste.
	07.02 Discuss methods of solid waste disposal.
	07.03 Discuss various solutions to solid waste accumulations and disposal.
	07.04 Identify a sanitary landfill.
	07.05 Discuss the construction features of a safe landfill.
	07.06 Discuss the possibilities of contaminates (leachates) seeping into the groundwater.
	07.07 Discuss the purpose for installing monitoring wells located around a sanitary landfill.
	07.08 Discuss the kinds of wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills. The student will be able to:

08.01 Secure information about a job.
08.02 Identify documents that may be required when applying for a job.
08.03 Demonstrate competence in job interview techniques.
08.04 Demonstrate knowledge of how to make job changes appropriately.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Water Quality Technician**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0703010404
Program Type	College Credit Certificate (CCC)
Program Length	12 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Environmental Science Technology AS degree program (1703010401).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to analysis and dispensing of water in accordance with appropriate federal, state, and local laws and regulations. The certificate will cover industry standards such as those included in the Clean Water Act. Graduates of this certificate program should be able to research applicable local, state, and federal regulations and implement methods and strategies to ensure compliance; to maintain records as required by OSHA, and the Environmental Protection Agency (EPA); and to control the process to transfer or treat water or liquid waste.

This program does not prepare individuals for the D, C, B or A level of Water or Wastewater Treatment Facility Operator Certification as those requirements are outlined in Department of Environmental Protection Rule 62-602.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge of the principles of managing water pollution through prevention and remediation.
02.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
03.0 Sample, analyze and calculate data related to air, water and soil pollutants.
04.0 Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
05.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Water Quality Technician**
CIP Number: **0703010404**
Program Length: **12 credit hours**

This certificate program is part of the Environmental Science Technology AS degree program (1703010401). At the completion of this program, the student will be able to:	
01.0	Demonstrate knowledge of the principles of managing water pollution through prevention and remediation. The student will be able to:
01.01	Determine chemical and physical properties of surface water and groundwater.
01.02	Describe microbial systems related to water pollution.
01.03	Describe surface water, groundwater systems, hydrologic cycle, potable water, and wastewater treatment processes.
01.04	Identify types and sources of surface water and groundwater contamination.
01.05	Describe legal aspects, laws, rules, and consequences related to surface and groundwater pollution.
01.06	Collect water samples for field and laboratory analysis.
01.07	Identify the water quality standards for effluent from domestic and various industrial wastewater facilities.
01.08	Describe ambient water quality criteria.
01.09	Demonstrate the technology and methods applied to non-point source pollution control (stormwater and agriculture runoff).
02.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants. The student will be able to:
02.01	Demonstrate knowledge of basic laboratory operation.
02.02	Operate and calibrate selected laboratory instruments.
02.03	Operate and calibrate selected field instruments and equipment.
03.0	Sample, analyze and calculate data related to air, water and soil pollutants. The student will be able to:
03.01	Gather and analyze selected samples.
03.02	Manipulate data and reach confident conclusions.
03.03	Write formal technical reports.

	03.04 Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent, surface water and groundwater.
04.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems. The student will be able to:
	04.01 Discuss the possibilities of contaminates (leachates) seeping into the groundwater.
	04.02 Discuss the purpose for installing monitoring wells located around a sanitary landfill.
05.0	Demonstrate employability skills. The student will be able to:
	05.01 Conduct a job search.
	05.02 Secure information about a job.
	05.03 Identify documents that may be required when applying for a job.
	05.04 Complete a job application.
	05.05 Demonstrate competence in job interview techniques.
	05.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
	05.07 Identify acceptable work habits.
	05.08 Demonstrate knowledge of how to make job changes appropriately.
	05.09 Demonstrate acceptable employee health habits and safety skills.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method is offered, the following is required for each student: (1) a training plan signed by the student, the instructor and the employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and (2) a work station which reflects equipment, skills, and tasks relevant to the student's career goal. Students must receive compensation for work performed.

In accordance with State Board of Education Rule 6A-10.0315, minimum basic skill levels have been established for admittance into a college associate degree program.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Environmental Science Technician**
Career Cluster: **Agriculture, Food and Natural Resources**

CCC	
CIP Number	0703010407
Program Type	College Credit Certificate (CCC)
Program Length	30 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This certificate program is part of the Environmental Science Technology AS degree program (1703010401).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction in worker health and safety, transportation of hazardous materials, and a focus on federal regulations for environmental protection. Instruction includes the analysis, handling, storage, transportation, and dispensing of hazardous materials in accordance with appropriate regulations and the planning for the protection of employees/workers/communities from hazardous material exposures.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge of the principles of managing water pollution through prevention and remediation
02.0 Demonstrate knowledge of the principles of managing air pollution through prevention and remediation
03.0 Demonstrate awareness of environmental noise sources and their monitoring.
04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
05.0 Sample, analyze and calculate data related to air, water, and soil pollutants.
06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
07.0 Demonstrate and awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
08.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Environmental Science Technician**
CIP Numbers: **0703010407**
Program Length: **30 credit hours**

This certificate program is part of Environmental Science Technology AS degree program (1703010401). At the completion of this program, the student will be able to:	
01.0	Demonstrate knowledge of the principles of managing water pollution through prevention and remediation. The student will be able to:
01.01	Determine chemical and physical properties of surface water and groundwater.
01.02	Describe legal aspects, laws, rules, and consequences of related to surface and groundwater pollution.
02.0	Demonstrate knowledge of the principles of managing air pollution through prevention and remediation. The student will be able to:
02.01	Identify natural and manmade pollutants; their sources, effects, and control techniques.
02.02	Collect and analyze ambient and process air samples.
02.03	List the regulated parameters of emission for selected industrial sources.
02.04	Record, interpret and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring. The student will be able to:
03.01	Define and discuss the physical properties of sound.
03.02	Discuss the threshold of hearing, tolerance, and hearing loss.
03.03	Discuss environmental noise, its effect on humans, and solutions to noise pollution.
03.04	Identify the regulatory agencies that monitor and control~~s~~ noise sources.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants. The student will be able to:
04.01	Demonstrate knowledge of basic laboratory operation.
04.02	Operate and calibrate selected laboratory instruments.
04.03	Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze and calculate data related to air, water and soil pollutants. The student will be able to:

	05.01 Manipulate data and reach confident conclusions.
	05.02 Write formal technical reports.
	05.03 Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent, surface water and groundwater.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control. The student will be able to:
	06.01 Discuss types and sources of radiation.
	06.02 Discuss the immediate and long range effects of radiation on animals and plants.
	06.03 Discuss nuclear power plant design, nuclear power hazards, and safety features.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems. The student will be able to:
	07.01 Discuss the composition, sources, and quantity of solid waste.
	07.02 Discuss methods of solid waste disposal.
	07.03 Identify the solid wastes from domestic households, municipalities, and industry.
	07.04 Discuss those wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills. The student will be able to:
	08.01 Secure information about a job.
	08.02 Identify documents that may be required when applying for a job.
	08.03 Complete a job application.
	08.04 Demonstrate competence in job interview techniques.
	08.05 Identify acceptable work habits.
	08.06 Demonstrate knowledge of how to make job changes appropriately.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Agribusiness Management**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101010100
Program Type	College Credit
Program Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of farms and agricultural business. Subject matter includes finance, laws, labor, machinery, facilities, and marketing, as well as leadership, communication, employability, and human relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Obtain and dispose of an agricultural enterprise.
02.0 Prepare and administer an agricultural oriented plan (manage the crop/livestock plan).
03.0 Supervise and manage the operation, maintenance, and repair of equipment.
04.0 Manage facilities and structures.
05.0 Select sources and methods of financing operation.
06.0 Interpret and apply state and federal rules and regulations.
07.0 Perform accounting activities.
08.0 Perform communication activities.
09.0 Develop human relations skills.
10.0 Demonstrate employability skills.
11.0 Develop leadership skills.
12.0 Identify, classify, and demonstrate management activities.
13.0 Demonstrate a basic understanding of legal and ethical issues in a business environment.
14.0 Demonstrate basic computer skills.

In addition, students will complete the objectives in one of the following specializations:

Forest Operations

15.0 Prepare and administer forest management plans.
16.0 Plan and administer forest inventories.
17.0 Assist registered land surveyor in location of property corners and boundary lines, road construction and drainage projects.
18.0 Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control.
19.0 Identify major southeastern forest tree species.
20.0 Identify and control major southeastern forest insects and diseases.
21.0 Evaluate forest ecosystems.
22.0 Evaluate forest soils with respect to chemical and fertilizer applications and hydrology.
23.0 Collect, maintain and/or analyze data and records.
24.0 Prepare, analyze, and enforce contracts and other legal documents.
25.0 Administer the purchase, sale and/or marketing of forest products.

Irrigation Technology

26.0 Demonstrate an understanding of the use of communications in an irrigation business environment.
27.0 Demonstrate an understanding of the types of pipe installation common to irrigation systems.
28.0 Demonstrate an understanding of irrigation system components.
29.0 Demonstrate an understanding of basic design principles used in irrigation systems.
30.0 Demonstrate an understanding of basic irrigation system maintenance and operation.

31.0 Demonstrate an understanding of distribution systems used in the irrigation industry.
32.0 Demonstrate an understanding of control systems used in irrigation installation and repair.
33.0 Demonstrate an understanding of water supply.
34.0 Demonstrate an understanding of sprinkler performance.
35.0 Demonstrate an understanding of site analysis in residential and commercial irrigation systems.
36.0 Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems.
37.0 Demonstrate an understanding of job preparation necessary in residential and commercial irrigation systems.
38.0 Demonstrate an understanding of installation techniques used in residential and commercial irrigation systems.
39.0 Demonstrate an understanding of how to obtain site information necessary in the residential irrigation system design process.
40.0 Demonstrate an understanding of selection and safe use of equipment for residential irrigation system installation.
41.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific residential irrigation system installations.
42.0 Demonstrate an understanding of microcomputer applications used to design residential irrigation systems.
43.0 Demonstrate an understanding of the role of “the green industry.”
44.0 Demonstrate an understanding of the basic principles of plant growth.
45.0 Demonstrate an understanding of the role of plant nutrients and fertilizers.
46.0 Demonstrate an understanding of pest management practices.
47.0 Demonstrate an understanding of the role of irrigation.
48.0 Demonstrate an understanding of the role of soil science.
49.0 Demonstrate an understanding of plants used in urban and suburban landscapes.
50.0 Demonstrate an understanding of the basic safety issues involved in the “green industry.”
51.0 Demonstrate an understanding of the water cycle.
52.0 Demonstrate an understanding of the uses of water resources.
53.0 Demonstrate an understanding of water resource policies in Florida.
54.0 Demonstrate an understanding of surface water supplies.
55.0 Demonstrate an understanding of groundwater supplies.
56.0 Demonstrate an understanding of drip system components.
57.0 Demonstrate an understanding of the characteristics of water emission devices.
58.0 Demonstrate an understanding of basic design principles for low volume irrigation systems.
59.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems.
60.0 Demonstrate an understanding of irrigation system computer software currently used in industry.
61.0 Demonstrate an understanding of materials selection and costing needed for sales presentations.
62.0 Develop an understanding of the breadth of the irrigation industry.
63.0 Demonstrate an understanding of irrigation water requirements.
64.0 Demonstrate an understanding of economic analysis as applied to irrigation investment decisions.
65.0 Demonstrate an understanding of methods of develop overall operating and maintenance procedures.
66.0 Demonstrate an understanding of analysis of irrigation systems.
67.0 Demonstrate an understanding of how to obtain site information necessary in the commercial irrigation system design process.
68.0 Demonstrate an understanding of selection and safe use of equipment for a commercial irrigation system installation.
69.0 Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific commercial irrigation system installations.
70.0 Demonstrate an understanding of writing irrigation specifications.

71.0 Demonstrate an understanding of advanced hydraulic and head lay out concepts.

Horticulture Technician

72.0 Demonstrate an understanding of plant physiology and growth.
73.0 Classify plants.
74.0 Select, operate, and maintain tools and equipment.
75.0 Fertilize plants.
76.0 Manage a pest-control program.
77.0 Prune and shape plants.
78.0 Maintain landscape plants.
79.0 Demonstrate employability skills.
80.0 Determine drainage system needs and design a drainage system.
81.0 Maintain and analyze records.
82.0 Prepare growing media and seedbeds.
83.0 Propagate plants.
84.0 Grow plants.
85.0 Harvest, process, and ship plants.
86.0 Market plants.
87.0 Design, install, and maintain nursery irrigation systems.

Golf Course Technician

88.0 Supervise and manage the operation, maintenance, and repair of golf course equipment.
89.0 Schedule irrigation and manage the design, installation, and maintenance of golf course irrigation systems.
90.0 Prescribe, supervise, and manage the application of agricultural chemicals for the prevention and control of pests.
91.0 Prescribe, supervise, and manage the fertilization of the turf and landscape.
92.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs, and other areas.
93.0 Provide a safe environment for workers and patrons.
94.0 Keep and analyze maintenance, employee, equipment, and inventory records.
95.0 Observe local, state, and federal laws and regulations.
96.0 Demonstrate leadership, communication, public relations, employability, and human relations skills.
97.0 Demonstrate an understanding of the types of pipe installation common to irrigation system.
98.0 Demonstrate an understanding of irrigation system components.
99.0 Demonstrate an understanding of basic design principles used in irrigation systems.
100.0 Demonstrate an understanding of basic irrigation system maintenance and operation.
101.0 Demonstrate an understanding of sprinkler performance.
102.0 Demonstrate an understanding of the basic principles of plant growth.
103.0 Demonstrate an understanding of the role of plant nutrients and fertilizers.
104.0 Demonstrate an understanding of pest management practice.
105.0 Demonstrate an understanding of the role of irrigation.
106.0 Demonstrate an understanding of the basic safety issues involved in the “green industry”.

107.0 Demonstrate an understanding of the drip system components.
108.0 Demonstrate an understanding of basic design principles for low volume irrigation systems.
109.0 Demonstrate an understanding of procedures involved in installation of low volume irrigation systems.
110.0 Demonstrate an understanding of plant physiology and growth.
111.0 Classify plants.
112.0 Select, operate, and maintain tools and equipment.
113.0 Fertilize plants.
114.0 Manage a pest-control program.

Livestock Production Management

115.0 Manage crops.
116.0 Manage livestock.
117.0 Manage machinery and equipment.
118.0 Manage facilities.
119.0 Keep and analyze financial, production and production records.
120.0 Integrate state and federal regulations into the operation.
121.0 Demonstrate leadership, communication, employability and human relations skills.

Florida Department of Education
Student Performance Standards

Program Title: **Agribusiness Management**
CIP Number: **1101010100**
Program Length: **60 credit hours**

At the completion of this program, the student will be able to:	
01.0	Obtain and dispose of an agricultural enterprise. The student will be able to:
01.01	Develop plan for type and size of agricultural enterprise.
01.02	Obtain title to real estate.
01.03	Complete farm rental/lease agreement.
01.04	Purchase building insurance.
01.05	Purchase liability insurance.
01.06	Transfer agribusiness ownership.
02.0	Prepare and administer an agricultural oriented plan. The student will be able to:
02.01	Prepare land development plan.
02.02	Prepare agricultural plan in one of the following: crop or product program, irrigation, fertilization, pesticide, plant.
02.03	Enroll in Agricultural Stabilization Conservation Service Program if applicable.
02.04	Enroll in and review Soil Conservation Service Practices if applicable.
02.05	Contract for custom services.
02.06	Develop plan for purchase and operation of irrigation system.
02.07	Develop fertilization plan.
02.08	Develop pesticide plan.
02.09	Develop plan to meet seed/plant needs.
02.10	Develop marketing plan.

	02.11 Market livestock/livestock products.
	02.12 Purchase insurance.
03.0	Supervise and manage the operation, maintenance, and repair of equipment. The student will be able to:
	03.01 Develop budgets for changing the machinery and equipment program.
	03.02 Prepare inventory of farm machinery and equipment; harvest, fuel, and lubricants.
	03.03 Obtain machinery and equipment by purchase, rent, lease or trade.
	03.04 Develop plan for machinery and equipment maintenance program.
04.0	Manage facilities and structures. The student will be able to:
	04.01 Plan for the expansion of existing facilities or construction of new facilities.
	04.02 Develop plan for repairing, remodeling, improving facilities.
	04.03 Acquire buildings by purchase, rental, or lease.
	04.04 Purchase building supplies.
05.0	Select sources and methods of financing operation. The student will be able to:
	05.01 Analyze major sources of agricultural production credit.
	05.02 Analyze and select sources of credit for capital items and real estate.
	05.03 Prepare a case using accepted forms for obtaining credit from an agricultural lending institution.
	05.04 Analyze contracts, leases, and other legal documents.
	05.05 Analyze and interpret land use maps.
	05.06 Interpret a real estate legal description.
	05.07 Identify major elements in lease agreements.
	05.08 Identify major elements in contracts.
	05.09 Secure legal services.
06.0	Interpret and apply state and federal rules and regulations to enterprise. The student will be able to:

06.01	List agencies responsible for inspecting and regulating operation or product.
06.02	Secure necessary inspections, certifications, and registrations.
06.03	Maintain a file of current rules and regulations relative to operation.
06.04	List reasons for the necessity of inspections, certification, and regulations.
07.0	Perform accounting activities. The student will be able to:
07.01	Record and post transactions in a general journal.
07.02	Prepare an income statement and payroll records.
07.03	Prepare a balance sheet.
07.04	Prepare a cash flow statement.
07.05	Journalize and post-closing entries.
07.06	Demonstrate knowledge of petty case records.
07.07	Demonstrate knowledge of checking account records and bank reconciliation.
07.08	Interpret financial statements.
07.09	Demonstrate knowledge of the accounting cycle.
07.10	Demonstrate knowledge of budget principles and interpret budgets.
07.11	Demonstrate accounting operations on a computer.
07.12	Calculate and record depreciation, net worth, and income.
07.13	Complete a comparative trend analysis table.
07.14	Complete a profit and loss statement.
07.15	Calculate and record capital gains and losses, monthly/yearly receipts, operating expenses.
07.16	Balance bank statement.
07.17	Develop plan for bestowing the estate.
07.18	Complete IRS income or loss schedule, Capital gains and losses schedule, Investment credit schedule, 1040 schedule.

08.0	Perform communication activities. The student will be able to:
08.01	Demonstrate effective telephone usage and courtesy.
08.02	Demonstrate effective listening skills.
08.03	Give, follow, and interpret oral and written communication.
08.04	Demonstrate knowledge of e-mail etiquette and ethics.
08.05	Compose business correspondence and related documents and demonstrate correct spelling, grammar, punctuation, and work choice.
08.06	Prepare, outline, and deliver an effective short oral presentation.
08.07	Participate in a group discussion as a member and as a leader.
08.08	Obtain appropriate information from graphics and other visual media.
08.09	Research and interpret information retrieved from print and electronic resources.
08.10	Annotate letters, reports, and news articles.
08.11	Proofread and edit documents.
08.12	Research and compose a document containing statistical information.
08.13	Prepare visual material, including electronic media, to support an oral presentation.
08.14	Demonstrate ability to communicate effectively with diverse populations.
09.0	Develop human relation skills. The student will be able to:
09.01	Analyze and develop written solutions to behavior problems affecting job performance.
09.02	Demonstrate ability to work effectively as part of a team.
09.03	Demonstrate conflict resolution skills.
09.04	Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
09.05	Develop and demonstrate the unique human relations skills needed for success in the business sector.
09.06	Recognize different personality styles and how to interact effectively with them in the workplace.
09.07	Differentiate between an acceptable and unacceptable code of ethical conduct in business.

	09.08 Discuss how values and attitudes influence behavior.
	09.09 Explain how understanding of self-concept and self-esteem impacts human relations skills.
	09.10 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
10.0	Demonstrate employability skills. The student will be able to:
	10.01 Demonstrate understanding of acceptable hygiene and grooming habits.
	10.02 Identify sources of employment opportunities.
	10.03 Identify appropriate attire and grooming for a business office.
	10.04 Identify documents that may be required when applying for a job.
	10.05 Complete a resume and cover letter.
	10.06 Complete a job application form correctly.
	10.07 Prepare a plain-text resume for electronic distribution.
	10.08 Demonstrate effective job interview techniques.
	10.09 Demonstrate understanding of different types of interviews.
	10.10 Prepare a thank you letter for an interview.
	10.11 Identify and demonstrate appropriate responses to feedback from supervisors.
	10.12 Identify and demonstrate acceptable work habits.
	10.13 Demonstrate knowledge of how to make job and career changes appropriately.
	10.14 Demonstrate basic knowledge of employment law.
	10.15 Demonstrate ability to adapt to change.
	10.16 Demonstrate effective time management skills.
	10.17 Prepare a letter of resignation.
	10.18 Identify methods for securing an employment reference.
	10.19 Conduct a job search.

	10.20 Secure information about a job.
	10.21 Demonstrate competence in job interview techniques.
11.0	Develop leadership skills. The student will be able to:
	11.01 Demonstrate an understanding of how to plan and lead an effective meeting.
	11.02 Define effective leadership.
	11.03 Identify and explain key leadership behaviors.
	11.04 Compare different styles of leadership.
	11.05 Relate leadership to other management and communication skills.
	11.06 Examine ways effective leaders develop, coach, and motivate.
	11.07 Define organization vision and mission.
	11.08 Identify characteristics of effective goals.
	11.09 Describe personal leadership style.
	11.10 Explain how effective leaders identify problems and make decisions.
	11.11 Compare different styles of managing conflict.
	11.12 Identify acceptable work habits.
	11.13 Demonstrate knowledge of how to make job changes appropriately.
12.0	Identify, classify and demonstrate management activities. The student will be able to:
	12.01 Compare management styles.
	12.02 Identify the major functions of management.
	12.03 Demonstrate understanding of basic management concepts such as authority, responsibility, delegation, empowerment, and hiring and firing.
	12.04 Demonstrate knowledge of the relationship between authority and responsibility to task accomplishment.
	12.05 Select the most effective communication systems.
	12.06 Identify problems and make appropriate decisions.

	12.07 Demonstrate understanding of organizational culture and its impact on communication.
	12.08 Identify and discuss current management issues in business and other organizations.
	12.09 Describe activities associated with the management functions of planning, organizing, staffing, leading and controlling.
	12.10 Manage and supervise labor
	12.11 Develop labor supply plan.
	12.12 Hire and dismiss employees.
	12.13 Establish and record pay scale and benefits.
	12.14 Train workers using demonstration performance method.
	12.15 Develop employee work schedules
	12.16 Prepare payroll records.
13.0	Demonstrate a basic understanding of legal and ethical issues in a business environment. The student will be able to:
	13.01 Demonstrate basic understanding of contracts.
	13.02 Demonstrate basic understanding of human resource issues.
	13.03 Demonstrate basic understanding of negotiable instruments.
	13.04 Demonstrate basic understanding of intellectual property rights.
	13.05 Demonstrate basic understanding of appropriate use of employer property.
	13.06 Demonstrate basic understanding of confidentiality.
	13.07 Demonstrate basic understanding of role of ethical decision making in dealing with stakeholders.
	13.08 Demonstrate knowledge of social responsibilities.
	13.09 Demonstrate knowledge of legal and privacy issues regarding e-mail, voice mail, internet, telephone, and other communication methods.
14.0	Demonstrate basic computer skills. The student will be able to:
	14.01 Demonstrate Keyboarding Techniques.
	14.02 Demonstrate basic proficiency in spreadsheet, word processing, database, and presentation software and e-mail communication.

	14.03 Perform research using the internet and intranet.
Forest Operations	
15.0	Prepare and administer forest management plans. The student will be able to:
	15.01 Prepare and conduct a statistically based forest inventory.
	15.02 Calculate, analyze, and evaluate forest inventory data.
	15.03 Write an approximate management plan for tract based on landowner objectives including timber volumes, harvesting schedules, regeneration schedules, stand maps, stand, and stock tables and recommendations for multiple-use and for future management.
	15.04 Select and execute appropriate silvicultural system for tract.
	15.05 Conduct a prescribed burn including pre-planning, permitting, firing systems, smoke management and suppression techniques.
	15.06 Plan and execute timber stand improvement when needed.
	15.07 Plan and execute appropriate site preparation, tree planting and harvesting.
	15.08 Demonstrate knowledge of ordinances related to harvesting and regeneration activities.
16.0	Plan and administer forest inventories. The student will be able to:
	16.01 Prepare and conduct a statistically based forest inventory using area samples, i.e., fixed-radius plot inventory.
	16.02 Prepare and conduct a statistically based forest inventory using point sample, i.e., prism inventory.
	16.03 Operate dendrometers such as tree calipers and diameter tape.
	16.04 Operate hypsometers such as altimeter, clinometers and relaskop.
	16.05 Operate hand-held magnetic compass and demonstrate proper pacing procedure in forested situations.
	16.06 Locate forest tracts using legal description, maps, aerial photos, and atlases.
	16.07 Select and use appropriate volume tables.
	16.08 Calculate timber volumes by forest products.
	16.09 Calculate and prepare valuation of forest tract based on product and current market prices.
	16.10 Prepare "lump sum" timber bid.
	16.11 Prepare "per unit" timber bid.

	16.12 Calculate and prepare stand and stock tables.
	16.13 Calculate and prepare growth projections and regeneration stocking.
	16.14 Calculate tract averages using maps, aerial photos and/or pacing.
17.0	Assist registered land surveyor in location of property corners and boundary lines, road construction and drainage projects. The student will be able to:
	17.01 Identify forest tracts based on legal description and write proper legal description for given forest tract.
	17.02 Locate and mark forest tract corners and boundary lines.
	17.03 Determine forest road location and identify on the ground.
	17.04 Determine drainage patterns for watershed and locate proper stream crossing points.
	17.05 Obtain proper permits for stream crossings, i.e., culverts, bridges.
18.0	Prepare and administer forest fire and smoke management plans and assist in forest fire suppression and control. The student will be able to:
	18.01 Demonstrate knowledge of various firing techniques.
	18.02 Demonstrate knowledge of weather conditions as related to forest fire-prescribed and wildfire - and smoke management.
	18.03 Select proper firing techniques based on landowner objectives and weather conditions.
	18.04 Demonstrate knowledge of fire suppression tools and equipment, both hand tools and mechanical.
	18.05 Demonstrate knowledge of pre-suppression forest fire activities.
	18.06 Evaluate acreage and damages of wildfire and recommend future forest management activities to renew resource.
	18.07 Plan and administer a fire and smoke management plan including proper burning authorizations.
	18.08 Complete U.S. Forest Service S-190, Introduction to Fire Behavior, and S-130, Basic Fire Fighter course with passing scores and, when possible, receive Incident Qualification Card ("Red Card").
19.0	Identify major southeastern forest tree species. The student will be able to:
	19.01 Identify major commercial forest species of the southeast United States by scientific name, common name, habitat, and commercial products derived from species.
	19.02 Identify major commercial forest species of Florida, with or without foliage, by personal observation using the five senses.
	19.03 Use dichotomous key to identify unfamiliar species.

20.0	Identify and control major southeastern forest insects and diseases. The student will be able to:
20.01	Identify major forest insects and diseases of the southeastern United States by scientific name, common name and damage inflicted.
20.02	Identify major forest insects and diseases of the southeastern United States by scientific name, common name, symptoms, and damage inflicted and recommendations for control.
20.03	Identify major forest insects and diseases of Florida in the forest by personal observation and recommend appropriate controls.
20.04	Demonstrate knowledge of chemical and biological control of forest pests.
20.05	Evaluate damages by forest insects and diseases and make recommendations for future forest management.
21.0	Evaluate forest ecosystems. The student will be able to:
21.01	Demonstrate knowledge of the major forest ecosystems of the United States.
21.02	Identify the major forest ecosystems of Florida.
21.03	Identify the relationship between human activities and forest flora and fauna.
21.04	Identify endangered species of Florida and associated regulations and/or recommended forest practices.
21.05	Demonstrate knowledge of threatened species of Florida and associated regulations and/or recommended forest practices.
21.06	Demonstrate knowledge of forest ecosystem practices on both private and public lands.
22.0	Evaluate forest soils with respect to chemical and fertilizer applications and hydrology. The student will be able to:
22.01	Demonstrate knowledge of the major forest soil types in the southeastern United States.
22.02	Identify and classify the major forest soil types of Florida.
22.03	Identify types, uses and application rates of approved forest herbicides.
22.04	Prepare and execute a herbicide plan.
22.05	Identify fertilizer formulations applicable to Florida forest soils.
22.06	Identify proper fertilizer formulations rates with proper soil type on Florida forest soils.
22.07	Define major watersheds and hydrology of a given forest area.
22.08	Demonstrate knowledge of Best Management Practices (BMP), especially special management zones (SMZ).

	22.09 Identify and locate SMZ on the ground.
	22.10 Obtain proper permits relating to stream crossings, ditching, cut and fill and wetland harvesting.
23.0	Collect, maintain and/or analyze data and records. The student will be able to:
	23.01 Collect field data from forest inventory
	23.02 Setup and maintain files of technical forestry information.
	23.03 Demonstrate knowledge of federal, state, and local regulations related to forestry practices.
24.0	Prepare, analyze, and enforce contracts and other legal documents. The student will be able to:
	24.01 Demonstrate knowledge of types of contracts and legal documents related to forestry practices.
	24.02 Select proper timber sale contract for given situation and prepare and execute same under supervision of forester and/or legal counsel.
	24.03 Obtain and maintain proper licensure, certifications, and registrations.
25.0	Administer the purchase, sale and/or marketing of forest products. The student will be able to:
	25.01 Demonstrate knowledge of various forest products and markets.
	25.02 Identify Florida forest products and current market valuations.
	25.03 Identify timber harvesting systems used in southeastern United States.
	25.04 Prepare and execute a timber sale, either lump sum or per unit.
	25.05 Supervise timber harvesting activities.
	25.06 Scale forest products.
Irrigation Technology	
26.0	Demonstrate an understanding of the use of communications in an irrigation business environment. The student will be able to:
	26.01 Explain the communications patterns used in the irrigation industry, including connected network and chain of command.
	26.02 Define common irrigation vocabulary terms.
	26.03 Locate specific engineering information from print and on-line sources.
27.0	Demonstrate an understanding of the types of pipe installation common to irrigation systems. The student will be able to:

	27.01 List the different types and schedules of available Polyvinyl Chloride (PVC) pipes.
	27.02 Describe the different types of available fittings including solvent weld, o-rings, and mechanical joint (MJ) joints.
	27.03 Describe the basic chemical reactions that occur in the manufacture of PVC pipe.
	27.04 Explain the process of connecting PVC pipe by using solvent weld chemicals.
	27.05 Explain the process of connecting o-ring pipe by using push-on fittings.
28.0	Demonstrate an understanding of irrigation system components. The student will be able to:
	28.01 Identify various irrigation system types such as rotors, sprays, and drip.
	28.02 Explain the process of time clock selection.
	28.03 Explain the process of valve selection.
	28.04 Explain the process of sprinkler head selection.
	28.05 Explain the process of low-voltage wire selection.
29.0	Demonstrate an understanding of basic design principles used in irrigation systems. The student will be able to:
	29.01 Calculate the static or working water pressure at a given point in the system.
	29.02 Determine the velocity for certain type and size pipe at a given flow.
	29.03 Select appropriate sprinkler heads for specific applications.
	29.04 Group irrigation heads to form irrigation zones complying with proper design criteria.
	29.05 Calculate specific friction loss through piping.
	29.06 Compute the precipitation rate for various sprinkler types and spacing patterns.
30.0	Demonstrate an understanding of basic irrigation system maintenance and operation. The student will be able to:
	30.01 Determine the watering time needed per week per station.
	30.02 Develop a water schedule based on proper design principles.
	30.03 Read and explain an as-built drawing.
	30.04 Explain the process of remove and install sprinkler heads.

	30.05 Describe introductory the process of automatic control valve repair.
	30.06 Describe the process of automatic controller repair.
	30.07 Diagnose and correcting wiring problems.
31.0	Demonstrate an understanding of distribution systems used in the irrigation industry. The student will be able to:
	31.01 Diagnose low and high pressure conditions that result from damaged piping, faulty installation, and clogged piping.
	31.02 Repair zone lines using solvent weld fittings.
	31.03 Repair main lines using mechanical joint (MJ) couplings.
32.0	Demonstrate an understanding of control systems used in irrigation installation and repair. The student will be able to:
	32.01 Develop watering schedules and setting control timers.
	32.02 Diagnose control system using test meters and wire tracking equipment.
	32.03 Isolate problems into one of three areas for repair: control timer, field wiring, and control valve.
	32.04 Repair or replacing an automatic control timer.
	32.05 Repair/splicing field wiring.
	32.06 Repair/replacing faulty parts on the irrigation control valve.
33.0	Demonstrate an understanding of water supply. The student will be able to:
	33.01 Diagnose problems of water supply interruption.
	33.02 Diagnose problems with water quality.
	33.03 Repair or adjusting pump control systems.
	33.04 Repair adjusting backflow prevention devices.
	33.05 Clean filter media or screens.
34.0	Demonstrate an understanding of sprinkler performance. The student will be able to:
	34.01 Diagnose sprinkler distribution problems.
	34.02 Measure and analyze precipitation rates.

	34.03 Remove, clean, and reinstall heads.
	34.04 Repair and adjust heads.
	34.05 Adjust sprinkler head spacing if required.
35.0	Demonstrate an understanding of site analysis in residential and commercial irrigation systems. The student will be able to:
	35.01 Complete an accurate site drawing.
	35.02 Determine the watering requirements in view of the site plan.
	35.03 Identify unique site conditions that might affect installation.
	35.04 Identify the appropriate water source.
36.0	Demonstrate an understanding of and practice in design principles used in residential and commercial irrigation systems. The student will be able to:
	36.01 Lay out heads on a print utilizing graphic symbol.
	36.02 Select/sizing control valve.
	36.03 Select/sizing zone lines.
	36.04 Select/sizing main line.
37.0	Demonstrate an understanding of job preparation necessary in residential and commercial irrigation systems. The student will be able to:
	37.01 List the different types of underground utilities and how to locate them.
	37.02 Prepare a list of materials necessary to install the class designed irrigation system.
	37.03 Identify the tools and equipment needed to install the class designed irrigation system.
38.0	Demonstrate an understanding of installation techniques used in residential and commercial irrigation systems. The student will be able to:
	38.01 Use a walk behind trencher to excavate trenches.
	38.02 Hand digs a trench.
	38.03 Backfill and compact a trench.
	38.04 Measure, cut, clean, prime, and glue solvent weld PVC pipe.
	38.05 Cut and install o-ring pipe and fittings.

	38.06 Install spray heads and/or rotor heads.
	38.07 Install control valves.
	38.08 Install nozzles, adjusting flow rates, and setting pattern.
	38.09 Identify and install low voltage direct burial wire.
	38.10 Produce an “as-built” drawing.
39.0	Demonstrate an understanding of how to obtain site information necessary in the residential irrigation system design process. The student will be able to:
	39.01 Develop an accurate plot plan or site drawing.
	39.02 Determine the type of landscaping and water requirement for a specific site.
	39.03 Identify environmental traits such as soil type and weather for a specific site.
	39.04 Identify unique site conditions that might affect design or installation.
	39.05 Identify possible water sources and select appropriate source.
40.0	Demonstrate an understanding of selection and safe use of equipment for residential irrigation system installation. The student will be able to:
	40.01 Select appropriate sprinkler heads for each area.
	40.02 Lay out heads on print utilizing graphic symbols in an irrigation design.
	40.03 Group irrigation heads to form irrigation zones.
41.0	Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific residential irrigation system installations. The student will be able to:
	41.01 Determine the water volume and pressure available from the water supply.
	41.02 Select and sizing a control valve for each zone.
	41.03 Select and sizing pipe main line.
	41.04 Select and sizing pipe for zone lines.
42.0	Demonstrate an understanding of microcomputer applications used to design residential irrigation systems. The student will be able to:
	42.01 Enter the elements of a site plan into the computer.

	42.02 Use a scanner to enter a site plan into a microcomputer application.
	42.03 Lay out heads using a microcomputer application.
	42.04 Use a microcomputer application to group heads together to form irrigation zones.
	42.05 Use a microcomputer application to select pipe size.
43.0	Demonstrate an understanding of the role of “the green industry”. The student will be able to:
	43.01 Describe the importance of the “green industry” to local, state, and national economies.
	43.02 Explain the importance and impact of local, state, and federal regulations.
	43.03 Describe the relationship of the “green industry” to the environment.
44.0	Demonstrate an understanding of the principles of plant growth. The student will be able to:
	44.01 Describe the functions of plant parts including roots, stems, leaves, flowers, and fruits.
	44.02 Describe the processes of plant growth including photosynthesis, respiration, nutrient uptake, and respiration.
	44.03 Describe the growth characteristics, and use of subtropical and tropical landscape plants.
	44.04 Identify various landscape designs, natural systems and the plants associated with them.
	44.05 Describe the process of effective establishment of plants in the landscape.
	44.06 Describe the influences of the environment on the landscape including pollutants.
45.0	The student will demonstrate an understanding of the role of plant nutrients and fertilizers. The student will be able to:
	45.01 Identify the nutrients required for plant growth and the role of each.
	45.02 Identify the types and kinds of fertilizers.
	45.03 Read and interpreting fertilizer labels.
	45.04 Describe the application of various fertilizer formulations.
	45.05 Identify symptoms of nutritional deficiencies and toxicities of plants.
46.0	The student will demonstrate an understanding of pest management practices. The student will be able to:
	46.01 Describe the principles and benefits of integrated pest management.

	46.02 Explain the nature of physical and chemical damage to plants.
	46.03 Describe the selection process involved in the use of horticultural chemicals for arthropod pest control and subsequent implications of their usage.
	46.04 Explain the role of efficient irrigation in pest control.
	46.05 Explain the role of plant health in pest control.
47.0	Demonstrate an understanding of the role of irrigation. The student will be able to:
	47.01 List the components of Florida's fresh water systems.
	47.02 Explain evaporation transpiration rate.
	47.03 Explain hydro zoning/precipitation rate.
	47.04 Identify the water needs of plants.
	47.05 Explain the role of mulches in the landscape.
	47.06 Describe soil moisture retention and movement for various soil types.
48.0	Demonstrate an understanding of the role of soil science. The student will be able to:
	48.01 Identify soil types and textures.
	48.02 Explain the role of soil pH and soluble salts on plant growth.
	48.03 Explain the physical properties of fill soil.
	48.04 Explain the role of soil type as it affects water retention.
	48.05 Interpret soil test information.
	48.06 Read and understanding soil survey maps.
49.0	Demonstrate an understanding of plants used in urban and suburban landscapes. The student will be able to:
	49.01 Describe the process of binomial nomenclature.
	49.02 Describe the use of bedding plants and other herbaceous perennials.
	49.03 Describe the use of ground covers, shrubs, trees, and vines including angiosperms and gymnosperms.
	49.04 Describe the use of palms, grasses, and other monocots.

50.0	Demonstrate an understanding of the basic safety issues involved in the “green industry”. The student will be able to:
	50.01 List the most common causes of accidents in the “green industry.”
	50.02 Discuss the importance of following proper safety precautions.
	50.03 Describe the symptoms of pesticide poisoning.
	50.04 Extract pertinent information from material safety data sheets.
51.0	Demonstrate an understanding of the water cycle. The student will be able to:
	51.01 Describe the role of precipitation.
	51.02 Explain the effects of evaporation and transpiration.
	51.03 Describe the effects of runoff on water supply and quality.
	51.04 Explain the process of ground water infiltration.
	51.05 Describe how different ecosystems affect the water supply.
52.0	Demonstrate an understanding of the uses of water resources. The student will be able to:
	52.01 List the uses and quantity of water used on a global scale.
	52.02 List the uses and quantity of water used in the United States.
	52.03 List the uses and quantity of water used in Florida.
53.0	Demonstrate an understanding of water resource policies in Florida. The student will be able to:
	53.01 Explain the role that planning agencies have on water supply and quality.
	53.02 Explain the effect the current legislation has on water supply and quality.
	53.03 List the pending legislation that may affect the water supply and quality.
54.0	Demonstrate an understanding of surface water supplies. The student will be able to:
	54.01 Explain the role of rivers, lakes, and reservoirs.
	54.02 Explain the importance of flood damage reduction planning.
	54.03 Explain the issues involved in ensuring that surface water supplies are properly managed.

55.0	Demonstrate an understanding of groundwater supplies. The student will be able to:
	55.01 Describe groundwater's role as a water source.
	55.02 Describe the effect of pollutants on groundwater.
	55.03 Describe the role of the aquifer and the regional aquifer characteristics.
	55.04 Describe the effect that water pumped from the ground has on the water table.
56.0	Demonstrate an understanding of drip system components. The student will be able to:
	56.01 Identify the various types of water emitters.
	56.02 Identify and explain the use of drip lateral materials.
	56.03 Identify and explain the use of pressure regulators.
	56.04 Identify and explain the use of valves including flush valves, control valves and air vents.
57.0	Demonstrate an understanding of the characteristics of water emission devices. The student will be able to:
	57.01 Identify and explain the operation of orifice emitters.
	57.02 Identify and explain the operation of laminar flow emitters.
	57.03 Identify and explain the operation of turbulent flow emitters.
	57.04 Identify and explain the operation of vortex emitters.
	57.05 Identify and explain the operation of pressure compensating emitters.
	57.06 Explain emission uniformity and quality.
58.0	Demonstrate an understanding of basic design principles for low volume irrigation systems. The student will be able to:
	58.01 Analyze the irrigation site and gathering appropriate site data.
	58.02 Identify point or line source area.
	58.03 Determine the appropriate irrigation method for each area.
	58.04 Determine the number of water emitters required per plant per area.
	58.05 Adapt irrigation requirements to available water supply.

59.0	Demonstrate an understanding of procedures involved in installation of low volume irrigation systems. The student will be able to:
	59.01 Connect the main water line to a point of connection.
	59.02 Run lateral lines.
	59.03 Run distribution tubing.
	59.04 Install emitters.
	59.05 Develop an irrigation schedule.
60.0	Demonstrate an understanding of irrigation system computer software currently used in industry. The student will be able to:
	60.01 Participate in seminars presented by industry professionals.
	60.02 Identify the basic concepts of computerized control systems.
61.0	Demonstrate an understanding of materials selection and costing needed for sales presentations. The student will be able to:
	61.01 Research materials costs for an irrigation project.
	61.02 Visit wholesale supply houses.
62.0	Develop an understanding of the breadth of the irrigation industry. The student will be able to:
	62.01 Describe an irrigation company.
	62.02 Describe an irrigation supply wholesale business.
	62.03 Describe the use of irrigation in a greenhouse.
	62.04 Describe the use of irrigation in a golf course.
	62.05 Describe the use of irrigation in a park.
	62.06 Describe the use of irrigation in a commercial irrigation installation.
	62.07 Describe the use of irrigation in a residential irrigation installation.
63.0	Demonstrate an understanding of irrigation water requirements. The student will be able to:
	63.01 Explain common system components and their effective water use.
	63.02 Explain basic concepts such as application rates, sprinkler spacing, and distribution uniformity.

	63.03 Explain matched precipitation rates.
	63.04 List the different types of soils and their infiltration rates.
64.0	Demonstrate an understanding of economic analysis as applied to irrigation investment decisions. The student will be able to:
	64.01 Describe the procedure for determining equipment and installation cost.
	64.02 Explain the process of computing ownership costs.
	64.03 Explain the process of determining total system cost.
65.0	Demonstrate an understanding of methods of develop overall operating and maintenance procedures. The student will be able to:
	65.01 Develop an efficient site watering schedule.
	65.02 Obtain product maintenance information.
	65.03 Explain how to develop an “as-built” drawing.
66.0	Demonstrate an understanding of analysis of irrigation systems. The student will be able to:
	66.01 List the different levels of evaluation.
	66.02 Describe and performing a visual inspection of an irrigation system.
	66.03 Describe and performing a flow inspection.
	66.04 Describe and performing a catch can test.
67.0	Demonstrate an understanding of how to obtain site information necessary in the commercial irrigation system design process. The student will be able to:
	67.01 Develop an accurate site drawing.
	67.02 Determine the type of landscaping and water requirement for a specific site.
	67.03 Identify environmental traits such as soil type and weather for a specific site.
	67.04 Identify unique site conditions that might affect design or installation.
	67.05 Identify possible water sources and select appropriate source.
68.0	Demonstrate an understanding of selection and safe use of equipment for a commercial irrigation system installation. The student will be able to:

	68.01 Select appropriate sprinkler heads for each area.
	68.02 Lay out heads on print utilizing graphic symbols in an irrigation design.
	68.03 Group irrigation heads to form irrigation zones.
69.0	Demonstrate an understanding of how to select pipe sizes and valves appropriate for specific commercial irrigation system installations. The student will be able to:
	69.01 Determine the water volume and pressure available from the water supply.
	69.02 Select and sizing a control valve for each zone.
	69.03 Select and sizing pipe main line.
	69.04 Select and sizing pipe for zone lines.
70.0	Demonstrate an understanding of writing irrigation specifications. The student will be able to:
	70.01 Review manufacturing and engineering data sheets and downloading from websites detailed drawings in preparation for an irrigation project.
	70.02 Conform to the Florida Irrigation Society Guidelines for landscape irrigation systems.
	70.03 Write specifications for a commercial irrigation project.
71.0	Demonstrate an understanding of advanced hydraulic and head layout concepts. The student will be able to:
	71.01 Describe the factors that determine system flow requirements.
	71.02 Explain the concepts of uniformity and efficiency.
	71.03 Explain the concepts of uniformity indicators.
	71.04 Demonstrate the ability to read sprinkler profiles.
	71.05 Demonstrate the ability to read sprinkler dens grams.
Horticulture Technician	
72.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
	72.01 Describe the process of photosynthesis.
	72.02 Identify and describe the functions of all parts of the plant.

	72.03 Describe an asexual reproduction process.
	72.04 Explain the differences between angiosperms and gymnosperms.
	72.05 Identify the differences between woody and herbaceous plants.
73.0	Classify plants. The student will be able to:
	73.01 Identify and group shade and flowering trees.
	73.02 Identify and group fruit trees and plants.
	73.03 Identify and group annuals, vegetables, and herbs.
	73.04 Identify and group woody ornamentals, vines, and ground covers.
	73.05 Identify and group tropical foliage plants.
	73.06 Identify and group turf and ornamental grasses.
74.0	Select, operate, and maintain tools and equipment. The student will be able to:
	74.01 Select and operate equipment for the job.
	74.02 Maintain an inventory of parts and supplies.
75.0	Fertilize plants. The student will be able to:
	75.01 Evaluate influences of nutrients on plant growth.
	75.02 Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
	75.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
76.0	Manage a pest-control program. The student will be able to:
	76.01 Develop an integrated pest management program or schedule.
	76.02 Train employees in the safe use of pesticides.
	76.03 Obtain a pesticide license.
77.0	Prune and shape plants. The student will be able to:
	77.01 Train employees in pruning techniques.

	77.02 Identify and use tools for pruning.
	77.03 Prune plants to achieve desired growth.
	77.04 Demonstrate sanitation and safety practices when pruning.
	77.05 Develop a pruning program and time schedule.
	77.06 Select and use chemical growth regulators.
	77.07 Root and prune ornamental plants and trees.
78.0	Maintain landscape plants. The student will be able to:
	78.01 Determine water requirements and apply at proper rates.
	78.02 Identify weeds and apply herbicides safely.
	78.03 Determine fertilization requirements and apply at proper rates.
	78.04 Regulate growth of landscape plants through chemical or mechanical needs.
	78.05 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
	78.06 Identify plant pest problems and apply corrective measures.
	78.07 Cultivate and mulch plants.
	78.08 Brace and repair trees.
79.0	Demonstrate employability skills. The student will be able to:
	79.01 Conduct a job search.
	79.02 Secure information about a job.
	79.03 Identify documents that may be required when applying for a job.
	79.04 Complete a job application form.
	79.05 Demonstrate competency in job interview techniques.
	79.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
	79.07 Identify acceptable work habits.

	79.08 Demonstrate knowledge of how to make job changes.
	79.09 Demonstrate acceptable employee health habits.
80.0	Determine drainage system needs and design a drainage system. The student will be able to:
	80.01 Determine the texture and percolation characteristics of the soil.
81.0	Maintain and analyze records. The student will be able to:
	81.01 Maintain fertilizer and pesticide application records.
	81.02 Use computers in the landscape and horticulture operations.
82.0	Prepare growing media and seedbeds. The student will be able to:
	82.01 Identify media materials.
	82.02 Mix rooting and growing media according to plant requirements.
	82.03 Sterilize rooting, potting, and growing media.
	82.04 Collect and test a soil sample from field and potting media.
	82.05 Adjust pH and nutritional levels of media.
	82.06 Prepare planting beds and sites.
	82.07 Fill and level benches and pots with media.
	82.08 Demonstrate sanitation practices when handling and storing plant media materials.
83.0	Propagate plants. The student will be able to:
	83.01 Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
	83.02 Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing.
	83.03 Prepare flats and a seedbed and plant seeds.
	83.04 Prepare a rooting bed.
	83.05 Prepare propagation materials (seeds, cuttings, scions, etc.)
	83.06 Apply growth stimulants to propagation materials.

	83.07 Transplant rooted propagation materials including tissue culture transplants.
	83.08 Demonstrate sanitation and safety practices when propagating.
84.0	Grow plants. The student will be able to:
	84.01 Prepare media for containers.
	84.02 Prepare field site for transplants.
	84.03 Select plant containers.
	84.04 Determine plant spacing in the field and on container beds.
	84.05 Transplant propagated materials to various containers and to the field.
	84.06 Determine and provide light requirements of various plant types.
85.0	Harvest, process, and ship plants. The student will be able to:
	85.01 Grade and harvest field-grown plants (ball, burlap, bare-root, “grow-bags”).
	85.02 Select, grade, and assemble container-grown plants.
	85.03 Prepare for shipment, loading, and transporting harvested plant materials.
86.0	Market plants. The student will be able to:
	86.01 Identify, inventory, and label marketable plants.
87.0	Design, install, and maintain nursery irrigation systems. The student will be able to:
	87.01 Determine irrigation requirements.
	87.02 Assess quality of irrigation water.
	87.03 Operate and service various types of irrigation systems.
Golf Course Technician	
88.0	Supervise and manage the operation, maintenance, and repair of golf course equipment. The student will be able to:
	88.01 Define the role of the golf course equipment mechanic in relation to the organization.
	88.02 Determine the essential power, shop and hand tools required in a golf course mechanics shop.

	88.03 Design a shop layout.
	88.04 Compile a list of equipment required in the operation of an 18-hole golf course.
	88.05 Demonstrate knowledge and use of golf course equipment.
	88.06 Develop and supervise a system of preventive maintenance.
	88.07 Sharpen and grind blades and cutting surfaces on all mowing equipment.
	88.08 Monitor and record the use of fuel, lubricants, and consumable shop supplies.
	88.09 Maintain a safe clean shop.
	88.10 Maintain current catalogs for supplies and equipment.
	88.11 Maintain tires and tire pressure on golf course equipment.
	88.12 Train and supervise employees in the safe use of tools and equipment.
89.0	Schedule irrigation and manage the design, installation, and maintenance of golf course irrigation systems. The student will be able to:
	89.01 Determine water requirements for a particular turf.
	89.02 Illustrate the design, computations, pumping capacity, and pipe sizing needed to irrigate a given operation.
	89.03 Schedule irrigation as required.
	89.04 Store and handle chemicals safely.
	89.05 Recognize symptoms of agricultural chemical poisoning and apply first aid.
	89.06 Dispose of chemical containers.
	89.07 Read and interpret safety precautions provided on equipment and pesticide containers.
90.0	Prescribe, supervise and manage the application of agricultural chemicals for the prevention and control of pests. The student will be able to:
	90.01 Instruct employees in the safe use of agricultural chemicals.
	90.02 Prepare proper proportions of chemicals and carrying agents.
	90.03 Compute amounts of active ingredients of chemicals to be used.
	90.04 Calibrate volume, pressure, and output of equipment.

	90.05 Weigh and measure chemicals.
	90.06 Adjust height and width of equipment to achieve desired spray pattern.
	90.07 Recognize symptoms of pesticide damage.
	90.08 Identify fungi and bacteria.
	90.09 Recognize symptoms of insects and nematodes.
	90.10 Identify common insects, weeds, diseases, and other pests common to golf courses.
	90.11 Clean and store sprayers.
91.0	Prescribe, supervise and manage the fertilization of the turf and landscape. The student will be able to:
	91.01 Take soil and leaf samples for chemical analysis.
	91.02 Adjust pH level of soil.
	91.03 Interpret soil and tissue chemical analysis results.
	91.04 Apply fertilizer in liquid form.
	91.05 Interpret labels on fertilizer containers.
	91.06 Apply dry fertilizers.
	91.07 Identify nutrient deficiency symptoms in turf and landscape plants.
	91.08 Determine kind and type of fertilizer to apply to a given area.
	91.09 Determine the nutrient requirements of various plants.
	91.10 Determine amount of fertilizer to apply to a given area.
	91.11 Analyze cost of various formulations and methods of application.
	91.12 Recognize fertilizer injury to plant materials.
92.0	Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs, and other areas. The student will be able to:
	92.01 Supervise the mowing of greens, collars, roughs, aprons, and fairways.
	92.02 Determine the placement and location of cups and tees.

	92.03 Supervise the repair of divots.
	92.04 Determine conditions necessary for verticuting and aerifying turf.
	92.05 Supervise the care and maintenance of sand traps.
	92.06 Prune trees and shrubs.
	92.07 Develop maintenance schedule for grooming golf courses.
	92.08 Train and supervise employees in the care of golf courses.
	92.09 Follow written and verbal instructions.
93.0	Provide a safe environment for workers and patrons. The student will be able to:
	93.01 Provide instruction for the safe use of chemicals, tools, and equipment.
	93.02 Inspect tools and equipment for safe operation.
	93.03 Apply emergency first aid.
	93.04 Monitor employees work habits.
	93.05 Maintain safety awareness.
94.0	Keep and analyze maintenance, employee, equipment, and inventory records. The student will be able to:
	94.01 Maintain equipment use and maintenance records.
	94.02 Maintain pesticide use information.
	94.03 Keep inventory records.
	94.04 Prepare a written report or summary based on records.
	94.05 Observe and make recommendations based on records.
	94.06 Evaluate employees, equipment and practices based on records.
95.0	Observe local, state and federal laws and regulations. The student will be able to:
	95.01 Observe OSHA rules and regulations.
	95.02 Observe EPA rules and regulations.

	95.03 Maintain a list of agencies responsible for regulating the industry.
96.0	Demonstrate leadership, communication, public relations, employability, and human relations skills. The student will be able to:
	96.01 Conduct a job search.
	96.02 Secure information about a job.
	96.03 Identify documents that may be required when applying for a job.
	96.04 Complete a job application form correctly.
	96.05 Demonstrate competence in job interview techniques.
	96.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
	96.07 Demonstrate acceptable employee health habits.
97.0	Demonstrate an understanding of the types of pipe installation common to irrigation systems. The student will be able to:
	97.01 List the different types and schedules of available Polyvinyl Chloride (PVC) pipes.
	97.02 Describe the different types of available fittings including solvent weld, o-rings, and mechanical joint (MJ) joints.
	97.03 Describe the basic chemical reactions that occur in the manufacture of PVC pipe.
	97.04 Explain the process of connecting PVC pipe by using solvent weld chemicals.
	97.05 Explain the process of connecting o-ring pipe by using push-on fittings.
98.0	Demonstrate an understanding of irrigation system components. The student will be able to:
	98.01 Identify various irrigation system types such as rotors, sprays, and drip.
	98.02 Explain the process of time clock selection.
	98.03 Explain the process of valve selection.
	98.04 Explain the process of sprinkler head selection.
	98.05 Explain the process of low-voltage wire selection.
99.0	Demonstrate an understanding of basic design principles used in irrigation systems. The student will be able to:
	99.01 Calculate the static or working water pressure at a given point in the system.

	99.02 Determine the velocity for certain type and size pipe at a given flow.
	99.03 Select appropriate sprinkler heads for specific applications.
	99.04 Group irrigation heads to form irrigation zones complying with proper design criteria.
	99.05 Calculate specific friction loss through piping.
	99.06 Compute the precipitation rate for various sprinkler types and spacing patterns.
100.0	Demonstrate an understanding of basic irrigation system maintenance and operation. The student will be able to:
	100.01 Determine the watering time needed per week per station.
	100.02 Develop a water schedule based on proper design principles.
	100.03 Read and explain an as-built drawing.
	100.04 Explain the process of remove and install sprinkler heads.
	100.05 Describe introductory the process of automatic control valve repair.
	100.06 Describe the process of automatic controller repair.
	100.07 Diagnose and correcting wiring problems.
101.0	Demonstrate an understanding of sprinkler performance. The student will be able to:
	101.01 Diagnose sprinkler distribution problems.
	101.02 Measure and analyze precipitation rates.
	101.03 Remove, clean, and reinstall heads.
	101.04 Repair and adjust heads.
	101.05 Adjust sprinkler head spacing if require
102.0	Demonstrate an understanding of the principles of plant growth. The student will be able to:
	102.01 Describe the functions of plant parts including roots, stems, leaves, flowers, and fruits.
	102.02 Describe the processes of plant growth including photosynthesis, respiration, nutrient uptake, and respiration.
	102.03 Describe the growth characteristics, and use of subtropical and tropical landscape plants.

	102.04 Identify various landscape designs, natural systems and the plants associated with them.
	102.05 Describe the process of effective establishment of plants in the landscape.
	102.06 Describe the influences of the environment on the landscape including pollutants.
103.0	The student will demonstrate an understanding of the role of plant nutrients and fertilizers. The student will be able to:
	103.01 Identify the nutrients required for plant growth and the role of each.
	103.02 Identify the types and kinds of fertilizers.
	103.03 Read and interpreting fertilizer labels.
	103.04 Describe the application of various fertilizer formulations.
	103.05 Identify symptoms of nutritional deficiencies and toxicities of plants.
104.0	The student will demonstrate an understanding of pest management practices. The student will be able to:
	104.01 Describe the principles and benefits of integrated pest management.
	104.02 Explain the nature of physical and chemical damage to plants.
	104.03 Describe the selection process involved in the use of horticultural chemicals for arthropod pest control and subsequent implications of their usage.
	104.04 Explain the role of efficient irrigation in pest control.
	104.05 Explain the role of plant health in pest control.
105.0	Demonstrate an understanding of the role of irrigation. The student will be able to:
	105.01 List the components of Florida’s fresh water systems.
	105.02 Explain evaporation transpiration rate.
	105.03 Explain hydro zoning/precipitation rate.
	105.04 Identify the water needs of plants.
	105.05 Explain the role of mulches in the landscape.
	105.06 Describe soil moisture retention and movement for various soil types.
106.0	Demonstrate an understanding of the basic safety issues involved in the “green industry”. The student will be able to:

	106.01 List the most common causes of accidents in the “green industry.”
	106.02 Discuss the importance of following proper safety precautions.
	106.03 Describe the symptoms of pesticide poisoning.
	106.04 Extract pertinent information from material safety data sheets.
107.0	Demonstrate an understanding of drip system components. The student will be able to:
	107.01 Identify the various types of water emitters.
	107.02 Identify and explain the use of drip lateral materials.
	107.03 Identify and explain the use of pressure regulators.
	107.04 Identify and explain the use of valves including flush valves, control valves and air vents.
108.0	Demonstrate an understanding of basic design principles for low volume irrigation systems. The student will be able to:
	108.01 Analyze the irrigation site and gathering appropriate site data.
	108.02 Identify point or line source area.
	108.03 Determine the appropriate irrigation method for each area.
	108.04 Determine the number of water emitters required per plant per area.
	108.05 Adapt irrigation requirements to available water supply.
109.0	Demonstrate an understanding of procedures involved in installation of low volume irrigation systems. The student will be able to:
	109.01 Connect the main water line to a point of connection.
	109.02 Run lateral lines.
	109.03 Run distribution tubing.
	109.04 Install emitters.
	109.05 Develop an irrigation schedule.
110.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
	110.01 Describe the process of photosynthesis.

	110.02 Identify and describe the functions of all parts of the plant.
	110.03 Describe an asexual reproduction process.
	110.04 Explain the differences between angiosperms and gymnosperms.
	110.05 Identify the differences between woody and herbaceous plants.
111.0	Classify plants. The student will be able to:
	111.01 Identify and group shade and flowering trees.
	111.02 Identify and group fruit trees and plants.
	111.03 Identify and group annuals, vegetables, and herbs.
	111.04 Identify and group woody ornamentals, vines, and ground covers.
	111.05 Identify and group tropical foliage plants.
	111.06 Identify and group turf and ornamental grasses.
112.0	Select, operate, and maintain tools and equipment. The student will be able to:
	112.01 Select and operate equipment for the job.
	112.02 Maintain an inventory of parts and supplies.
113.0	Fertilize plants. The student will be able to:
	113.01 Evaluate influences of nutrients on plant growth.
	113.02 Apply fertilizers, using appropriate methods (dry, liquid, slow-release, injection, etc.).
	113.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
114.0	Manage a pest-control program. The student will be able to:
	114.01 Develop an integrated pest management program or schedule.
	114.02 Train employees in the safe use of pesticides.
	114.03 Obtain a pesticide license.
Livestock Production Management	

115.0	Manage crops. The student will be able to:
	115.01 Prepare a land use plan.
	115.02 Determine long-range conservation practices.
	115.03 Prepare soil for crops.
	115.04 Select crop varieties best suited for land, market and type of farm operation.
	115.05 Determine seeding/planting rate and spacing.
	115.06 Calibrate and adjust planting equipment
	115.07 Plant crops.
	115.08 Select appropriate cultural practices including cultivation, fertilization and irrigation.
	115.09 Identify and control diseases, insects and pests.
	115.10 Determine maturity of crops.
	115.11 Harvest crops.
	115.12 Store crops.
	115.13 Determine the most advantageous method of marketing crops.
116.0	Manage livestock. The student will be able to:
	116.01 Select and/or breed livestock.
	116.02 Determine nutritional requirements and balance livestock rations.
	116.03 Prepare a feeding schedule.
	116.04 Determine quality of pasture range or forage.
	116.05 Provide for winter rations and supplements.
	116.06 Maintain pasture fertility and quality.
	116.07 Develop a breeding/marketing plan for operation.
	116.08 Cull unproductive animals.

	116.09 Provide aid for animals with parturition problems.
	116.10 Care for newborn livestock.
	116.11 List causes of livestock infertility.
	116.12 Provide mineral supplement for animals.
	116.13 Determine most advantageous method of marketing livestock.
	116.14 Transport livestock.
	116.15 Identify and treat disorders, diseases and pests of livestock.
117.0	Manage machinery and equipment. The student will be able to:
	117.01 Assess needs for the purchases of new or replacement equipment.
	117.02 Maintain oil, fuel and hydraulic levels in equipment.
	117.03 Maintain tires, batteries and coolant system on all equipment and vehicles.
	117.04 Operate and service small gasoline engines.
	117.05 Replace hoses, belts and lines.
	117.06 Cut and weld with oxy-acetylene and arc welding equipment.
	117.07 Observe safety procedures when operating farm equipment.
	117.08 Develop a general maintenance schedule.
118.0	Manage facilities. The student will be able to:
	118.01 Safely operate and maintain general farm shop tools and equipment.
	118.02 Install and maintain electrical wiring and equipment.
	118.03 Square and build a farm structure.
	118.04 Determine a bill of materials for a farm construction project.
	118.05 Form and pour concrete.
	118.06 Build and repair fences, gates and pens.

	118.07 Develop a general maintenance schedule for facilities and equipment.
119.0	Keep and analyze financial, production and personnel records. The student will be able to:
	119.01 Keep fertilization and pesticide use records.
	119.02 Keep equipment maintenance and service records.
	119.03 Record cultural and production information.
	119.04 Determine cost efficiency of operations.
120.0	Integrate state and federal regulations into operation. The student will be able to:
	120.01 List agencies responsible for inspecting and regulating operation of product.
	120.02 Secure necessary inspection certificates and registrations.
	120.03 List reasons for the necessity of inspections, certifications and registrations.
121.0	Demonstrate leadership, communication, employability and human relations skills. The student will be able to:
	121.01 Develop citizenship awareness and responsibility.
	121.02 Demonstrate effective communication skills.
	121.03 Complete an employment application
	121.04 Demonstrate job interview skills.
	121.05 Demonstrate job interview skills.
	121.06 Recognize appropriate work habits.
	121.07 Identify associations and societies associated with occupation or profession.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

The AS degree in Agribusiness Management is a degree into which various agricultural certificates or ATDs can articulate. Up to 30 credits of an approved college credit certificate can be articulated into the 60 credit AS giving the student a “specialty” in various agricultural areas such as: irrigation, forestry, horticulture or golf course operations.

It is also recommended that students be members of professional organizations associated with the selected agricultural specialty (example: Florida Nursery Growers and Landscape Association, Florida Forestry Association, Florida Irrigation Society, Florida Turfgrass Association)

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates:

Livestock Production Management (0101030200) – 30 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Aquaculture Management**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101030301
Program Type	College Credit
Program Length	63 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to apply the economic and business principles involved in the organization, operation and management of aquaculture farms and businesses. Content includes, but is not limited to, instruction in ichthyology, fish breeding, fish nutrition, pond maintenance, diagnosis, and treatment of diseases in fish, economic and marketing principles for the production of an aquatic crop, business management of a fish farm, and field experience necessary to operate an aquaculture operation.

Additional Information relevant to this career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 63 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Identify important aquaculture plants and animals and describe their culture in various production units.
02.0 Perform general aquaculture production unit operations.
03.0 Determine methods of fish identification.
04.0 Demonstrate an understanding of water quality and aquaculture.
05.0 Maintain optimal nutrition for aquaculture organisms.
06.0 Diagnose and control common aquaculture maladies.
07.0 Operate and maintain aquaculture equipment.
08.0 Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms.
09.0 Perform general aquaculture nursery systems operations.
10.0 Demonstrate an ability to manage aquatic species in multiple production units over time.
11.0 Apply business, economic and marketing principles to the production of an aquatic crop.
12.0 Demonstrate management skills required to operate an aquaculture farm.
13.0 Manage a pond operation.

Florida Department of Education
Student Performance Standards

Program Title: **Aquaculture Management**
CIP Number: **1101030301**
Program Length: **63 credit hours**

At the completion of this program, the student will be able to:	
01.0	Identify important aquaculture plants and animals and describe their culture in various production units. The student will be able to:
01.01	Define aquaculture and describe the historical important of aquaculture to local, state, national and international economies.
01.02	List occupations in aquaculture production, processing, distribution, marketing, and service.
01.03	Identify important aquatic species and products produced by aquatic farmers in Florida, U. S., and foreign countries.
01.04	List the types of production units and systems employed by aquaculturist in Florida, U. S., and foreign countries.
01.05	Outline basic techniques for constructing ponds, tanks, raceways, net pens, and cages.
01.06	Describe basic production techniques for the culture of plants, mollusks, crustaceans, and finfish.
01.07	List and describe the major factors in growth of aquaculture species.
01.08	List important criteria in selecting a site for an aquaculture farm.
01.09	Describe natural fisheries and aquaculture production trends.
02.0	Perform general aquaculture production unit operations. The student will be able to:
02.01	Identify and describe the general anatomy, biology and life cycles for aquaculture species studied in this program.
02.02	Identify and describe the general morphology of aquatic macro and microalgae.
02.03	List methods to help determine aquatic animal health and behavior for various aquaculture production units.
02.04	List techniques for routine maintenance of aquaculture ponds, cage culture systems, and submerged lands.
02.05	Identify common aquaculture predators and list predator control techniques
02.06	Record production data such as water quality parameters, feed amounts, mortality and other routine information required for a specific operation on data sheets and enter into a computer.
03.0	Determine methods of fish identification. The student will be able to:

	03.01 Identify the major families of fish.
	03.02 Describe the complexities of fish anatomy for the following systems: • Skeletal systems • Musculature • Nervous system • Vascular system • Respiratory system • Urogenital system • Digestive system • Reproductive system
	03.03 Identify the major anatomical fish structures.
	03.04 Describe the physiological characteristics of fish for the following: • Color • Bioluminescence • Sound production • Sensory systems • Osmoregulation
	03.05 Classify fish.
	03.06 Describe the aquatic environment.
	03.07 Discuss the basics of fish behavior.
	03.08 Identify the muscles of a fish.
	03.09 Measure the physical characteristics of fish.
04.0	Demonstrate an understanding of water quality and aquaculture. The student will be able to:
	04.01 Define environmental variables and list ranges important for survival and growth of important aquaculture species.
	04.02 Demonstrate an understanding of aquifers, water quantity and management, and agricultural water use in Florida.
	04.03 Identify water quality measurements necessary for accurately culturing aquaculture organisms.
	04.04 Measure water quality parameters in aquaculture production units, record data in logs and computers, and interpret results.
	04.05 Describe the nitrogen cycle and identify system equipment and/or processes which reduce nitrogenous wastes.
	04.06 Discuss the importance of oxygen to the maintenance of production units and aquatic animal health and the effect of temperature on oxygen concentration.

	04.07 Describe processes in aquaculture production units that effect pH, alkalinity, carbon dioxide, oxygen, ammonia, and other environmental parameters.
	04.08 Measure primary productivity and discuss its importance in various aquaculture production units.
	04.09 Calculate water volumes for various sizes of aquaculture production units.
	04.10 List potential sources of aquaculture pollution and describe methods of preventing or abating these problems.
	04.11 Identify Best Management Practices for treating waste water from various aquaculture production units.
05.0	Maintain optimal nutrition for aquaculture organisms. The student will be able to:
	05.01 Explain the digestive anatomy of fish.
	05.02 Explain fish metabolic rates.
	05.03 Identify fish food additives
	05.04 Outline the basic concepts of nutrition for plants, mollusks, crustaceans, and fish.
	05.05 Discuss the importance of nutrition to growth and survival of various aquaculture species.
	05.06 Identify feeding habits and practices of a variety of aquaculture species.
	05.07 List common ingredients and additives of aquatic feeds and identify practices in feeds formulation and manufacturing.
	05.08 Demonstrate an ability to culture live feeds including microalgae, rotifers and artemia and discuss their importance.
	05.09 Calculate feeding rates, growth and feed conversion ratios for various aquaculture species stocked at different densities and rates.
	05.10 List different feeding methods, measure feed and maintain feed records in logs and computers.
	05.11 Discuss and differentiate feeding practices for hatchery, nursery and grow out of mollusks.
	05.12 Discuss nutrition practices for culturing aquatic plants.
	05.13 Discuss the principles of bioenergetics to growth.
06.0	Diagnose and control common aquaculture maladies. The student will be able to:
	06.01 Identify the common diseases that infect aquaculture organisms.
	06.02 Understand the basic mechanisms for control of disease.
	06.03 Identify common bacterial diseases and treatment options.

06.04	Identify common mycotic diseases and treatment options.
06.05	Identify common viral diseases and treatment options.
06.06	Identify common parasitic diseases and treatment options.
06.07	Discuss the relationship of nutrition, water quality and stress how they may cause disease in aquaculture organisms.
06.08	Prepare an aquatic organism for diagnostic examination or shipment.
06.09	Observe various diseases of aquatic organisms and demonstrate use of a microscope.
06.10	List approved drugs available for use in aquaculture.
06.11	Describe approved chemicals and their use in treating diseases.
06.12	Identify common aquatic parasites found in Florida waters.
06.13	Identify toxic environmental diseases in fish.
07.0	Operate and maintain aquaculture equipment. The student will be able to:
07.01	List equipment used in various production units necessary to raise plants, mollusks, crustaceans, and fish.
07.02	Set up and maintain standard aquaria.
07.03	Discuss the set-up of field aquaculture ponds.
07.04	Measure field parameters such as temperature, salinity, and hardness.
07.05	Set up a system to culture aquatic plants.
07.06	Demonstrate an ability to correctly use aquaculture equipment including, but not limited to, a thermometer, oxygen meter, refractometer, pH meter, pump, graduated cylinder, beaker, nets, siphon, scales, sieves, calipers, secchi disk, and a microscope.
07.07	Set up aquaculture filtration systems.
07.08	List equipment options of a recirculating system including solids removal, biofiltration, sterilization and aeration, and explain their basic functions.
07.09	Operate and perform system maintenance on a recirculating system.
07.10	Estimate pumping requirements and select an appropriately sized pump for a given system and water volume.
07.11	Layout a PVC plumbing scheme for a given aquaculture system with a sufficient number of valves to allow for bypass and isolation and then measure, cut and assemble that water system.

	07.12 Layout and put together an aeration system operated on airlift technology.
	07.13 Replace and install a pump.
	07.14 Perform simple calculations related to water volume, water flow and system loading.
	07.15 Use and operate tools and equipment safely.
	07.16 Measure productivity in aquaculture systems.
08.0	Assist in the maturation, spawning, larval and juvenile rearing of aquaculture organisms. The student will be able to:
	08.01 Describe the reproductive anatomy, function of reproductive organs, and reproductive cycles of selected aquaculture organisms.
	08.02 Differentiate between males and females of the same species.
	08.03 Relate environmental factors to successful reproduction of various aquaculture species.
	08.04 Explain the use of hormones, anesthetics, chemicals, antibiotics, and other techniques to manage broodstock and accelerate reproductive cycles and contrast the difference between environmental conditioning and induced spawning techniques.
	08.05 Maintain and care for broodstock and prepare spawning tanks and/or systems.
	08.06 Describe maturation, spawning, hatching, and larval rearing techniques for selected aquaculture species.
	08.07 Discuss the importance of nutrition at various stages of the larval rearing cycle for selected aquaculture species.
	08.08 Use a microscope to examine the stages and condition of eggs and larvae.
	08.09 Prepare, stock, feed and maintain larval rearing tanks.
	08.10 Culture live feeds and calculate feeding rates.
	08.11 Outline a maturation system design for selected aquatic species.
	08.12 List important practices and tasks in hatchery management.
	08.13 Estimate production numbers from a given spawn of a given species.
	08.14 Record hatching date in logs and computers and interpret results.
09.0	Perform general aquaculture nursery systems operations. The student will be able to:
	09.01 Maintain, clean, and operate a broodstock tank and list important practices in managing broodstock.
	09.02 Start, maintain, count, and harvest live feeds.

	09.03	Maintain a nursery system by demonstrating an ability to clean tanks and filtration equipment, adjust water flow and volume, set aeration, and monitor water quality and feeding levels.
	09.04	Describe and differentiate between land-based and field-based nursery systems, equipment, and operations.
	09.05	Monitor and record routine data such as feed amounts and times, temperature, oxygen, salinity, and ammonia and enter data into a computer or log book.
	09.06	List and describe nursery production systems and larval husbandry techniques for fish, crustaceans, and mollusks.
	09.07	Demonstrate practical hands-on experience in handling a variety of juvenile aquaculture organisms and operating nursery production units.
10.0	Demonstrate an ability to manage aquatic species in multiple production units over time. The student will be able to:	
	10.01	Identify routine management techniques involved in aquaculture.
	10.02	Calculate system volume and stocking strategies for given aquaculture production units.
	10.03	Develop a written protocol and design data sheets for daily feeding, water quality measuring, system maintenance, and other factors for various aquaculture production units culturing a given species.
	10.04	Periodically sample or otherwise determine growth and production unit biomass/density and adjust feeding rates accordingly.
	10.05	List methods of harvesting aquatic crops from various aquaculture production units and preparing them for shipment to market.
	10.06	Acclimate and transfer aquatic animals from one water source to another.
	10.07	Design, layout, build, and plumb a simple aquaculture recirculating or other aquaculture production unit system.
	10.08	Calculate production area or volume, stocking rates, densities, feeding rates, conversion and growth of a given species for a given aquaculture production unit system being supervised.
	10.09	Demonstrate an understanding of management principles and use of management decision-making tools, including a computer.
	10.10	List communication skills and identify work habits necessary for supervising employees.
11.0	Apply business, economic and marketing principles to the production of an aquatic crop. The student will be able to:	
	11.01	Describe aquaculture production and value of selected species in Florida, domestically, and internationally.
	11.02	List and access sources of market information and statistics for selected aquaculture species.
	11.03	Identify sources of competition both locally and globally.
	11.04	Identify critical risk factors which may limit success of a farm.
	11.05	Itemize fixed and variable costs of an aquaculture venture.

11.06	Explain the principles of production economics to include costs, taxes, interest, depreciation, record keeping, cash flow and financial statements.
11.07	Write a hypothetical business plan and a production plan for an aquaculture venture.
11.08	Describe factors and variables in selecting a site for an aquaculture facility, including land, water, proximity of markets, labor, and community acceptance.
11.09	Link culture system options to a given site and water resources.
11.10	Predict hypothetical production numbers for a given facility with given variables.
11.11	Outline a simple operating budget for an aquaculture facility including cash flow and financial statement.
11.12	Describe characteristics of a well-planned aquaculture facility.
11.13	Demonstrate use of a computer for record keeping production and decision-making.
11.14	Evaluate techniques for aquaculture marketing.
12.0	Demonstrate management skills required to operate an aquaculture farm. The student will be able to:
12.01	List rules, state statutes and federal regulations important to aquaculture.
12.02	Explain the regulations that govern aquaculture on the local, state, and national levels.
12.03	Describe permitting procedures for various species, sites, and aquaculture production units.
12.04	List Best Management Practices necessary to operate and permit selected aquaculture facilities.
12.05	Develop a production plan and budget for a given aquaculture facility, design a record keeping system, establish operating procedures, harvest schedules and determine potential profitability.
12.06	Demonstrate an ability to maintain farm records including property, insurance, personnel, payroll, permits and licenses, equipment and tangible property, aquatic animal inventory, accounts receivable, accounts payable, and others.
12.07	Define HACCP and discuss its importance to both processing and aquaculture.
12.08	List management skills necessary for effective supervision of employees.
13.0	Manage a pond operation. The student will be able to:
13.01	Explain the basic techniques for building aquaculture ponds.
13.02	Explain the aquifer water quality in Florida.
13.03	Perform water chemistry quality measurements and explain their importance.

13.04 Produce aquatic plants in an aquaculture environment.
13.05 Identify filtration systems for aquaculture.
13.06 Manage water quality.
13.07 Explain water treatments.
13.08 Perform plankton analysis.
13.09 Describe the value of aeration systems.
13.10 Discuss the design and set up a closed system.
13.11 Discuss the design and set up cage systems.
13.12 Measure primary productivity.
13.13 Explain the importance of pond fertilization.
13.14 Explain the feeding techniques for large pond operations.
13.15 Measure density of organisms.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates (CCC):

Aquaculture Technology (0101030302) – 26 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Equine Studies**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101050701
Program Type	College Credit
Program Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to prepare students for employment in equine industry occupations under one of two different specializations. **Equine Farm Management** includes careers such as entry level equine farm supervisory and management positions, assistant farm manager, broodmare/foal manager, yearling manager in a variety of equine enterprises, or First-Line Supervisors/Managers of Animal Husbandry and Animal Care Workers. Additional positions include entry level managerial positions in equine retail sales, managerial positions in service-based sectors of the equine industry or entrepreneurial opportunities in the equine industry. **Equine Exercise Physiology** trains students in the emerging field of equine athletic management, providing students with expertise in conditioning techniques, management of the equine athlete and rehabilitation techniques. Graduates will be employed as assistant trainers, rehabilitation technicians, grooms for high performance horses or independent contractors in horse care.

The content for both specializations includes instruction to individuals in the areas of planning, organizing, directing, and controlling of an equine operation with dual emphasis on:

- The science and care of equine species and the knowledge and understanding necessary for managing equine operations and husbandry and disease.
- Business skills such as financial management, marketing, employee relations, computer applications and business plan development.

The Equine Studies AS degree program should include the requirements specified in the statewide Articulation Manual.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

Equine Science Core

01.0 Identify veterinary terminology and illustrate equine health practices.
02.0 Analyze equine nutrient requirements and evaluate equine diets.
03.0 Identify, analyze, and apply basic concepts related to normal and abnormal equine behaviors.
04.0 Perform safe horse handling techniques.
05.0 Evaluate equine management systems for appropriate animal welfare, including housing, care, and regulations.
06.0 Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work-based learning activities and a portfolio.

Business Management Specialization

07.0 Identify equine industry sectors and business opportunities in a business plan.
08.0 Demonstrate techniques in evaluation, selection, and breeding of horses.
09.0 Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems.
10.0 Perform equine marketing and sales management functions.
11.0 Demonstrate leadership and effective communication in employee management.

Exercise Physiology

12.0 Design and manage physiological conditioning programs for the equine athlete.
13.0 Apply manual therapies for maintenance and therapeutic applications.
14.0 Identify and apply rehabilitation techniques using state-of-the-art equipment.
15.0 Evaluate hoof care, tack, and equipment for different equine athletic endeavors.

Florida Department of Education
Student Performance Standards

Program Title: **Equine Studies**
CIP Number: **1101050701**
Program Length: **60 credit hours**

At the completion of this program, the student will be able to:	
Equine Science Core	
01.0	Identify veterinary terminology and illustrate equine health practices. The student will be able to:
01.01	Understand equine diseases and establish appropriate wellness programs for equine populations.
01.02	Comprehend equine anatomy and form to function concepts.
01.03	Anticipate typical problems of performance and reproductive horses to prevent injury or poor health; effectively follow veterinarian orders to restore health and productivity.
01.04	Identify and describe equine anatomy, with special emphasis on physiology and function.
01.05	Provide first aid for horses.
01.06	Identify equine medications and demonstrate ability to administer as per veterinarian instructions.
02.0	Analyze equine nutrient requirements and evaluate equine diets. The student will be able to:
02.01	Evaluate equine diets according to nutrient requirements for different classes of horses (working, growing, lactating).
02.02	Determine economic impact of feedstuff purchasing decisions.
02.03	Maintain safe feeding management programs for enhanced equine health.
02.04	Prepare a typical diet for horses of different classes.
02.05	Understand feed manufacturing techniques and feed analysis systems.
03.0	Identify, analyze and apply basic concepts related to normal and abnormal equine behaviors. The student will be able to:
03.01	Understand and recognize natural horse behaviors.
03.02	Identify and resolve abnormal equine behaviors.
03.03	Utilize horse learning behaviors to improve management and safe handling of horses.

04.0	Perform safe horse handling techniques. The student will be able to:
04.01	Safely catch, lead, tie, groom, restrain and work around horses of various levels of training.
04.02	Safely administer health and medical practices, such as leg wraps, vital signs, injections, and restraint for such treatments.
04.03	Evaluate safe transportation techniques and equipment for transportation.
04.04	Evaluate training equipment and demonstrate application of training equipment.
05.0	Evaluate equine management systems for appropriate animal welfare, including housing, care, and regulations. The student will be able to:
05.01	Describe housing designs for different equine management systems.
05.02	Identify appropriate levels of care and welfare for equines.
05.03	Develop a health care program for an equine farm including vaccination protocols, deworming schedules/programs, biosecurity and first aid.
06.0	Demonstrate employability skills including interpersonal skills, ethics, communication and responsibility through work-based learning activities and a portfolio. The student will be able to:
06.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
06.02	Demonstrate ability to work as part of a team.
06.03	Conduct a job search, write a resume, and practice interview techniques.
06.04	Understand legal requirements for employees including hiring, firing, and documentation.
06.05	Develop managerial skills such as mentoring, management by objectives, balanced feedback, critical appraisal, and promotion.
Business Management Specialization	
07.0	Identify equine industry sectors and business opportunities in a business plan. The student will be able to:
07.01	Identify breeds of horses and describe typical uses.
07.02	Understand evolution and the role horses have played in history and cultural development.
07.03	Develop awareness of critical issues to the horse industry such as legislative, regulatory, ethical, and environmental responsiveness.
07.04	Identify business opportunities in various equine sectors by evaluating market opportunity and profit potential.
07.05	Develop a business plan for a typical equine business specifically aimed at a financial institution for funding.

08.0	Demonstrate techniques in evaluation, selection, and breeding of horses. The student will be able to:
08.01	Evaluate equine conformation according to use and purpose.
08.02	Understand basic genetics and selection techniques for effective animal breeding.
08.03	Show ability to manage reproductive health and efficiency.
08.04	Develop appropriate management techniques for equine breeding farm, including stallion management, estrus detection, breeding, foaling and foal management.
09.0	Demonstrate ability to plan, schedule and maintain records and contracts, using appropriate technical information systems. The student will be able to:
09.01	Maintain and analyze equine records and basic business records (health, breeding, inventory, equipment, purchases, and depreciation).
09.02	Understand contract language and different types of contracts.
09.03	Maintain machinery, equipment, and facility inventory records.
09.04	Understand legal requirements, rules and regulations concerning horses and agribusiness.
09.05	Manage farm inventory (horses, feed, equipment) for optimum efficiency and profitability.
10.0	Perform equine marketing and sales management functions. The student will be able to:
10.01	Perform market analysis and collect market information.
10.02	Develop a marketing plan, including advertising, communications, promotional goals, and budget.
10.03	Actively participate in marketing activities, such as public speaking, demonstrations, clinics, shows, group activities and community service.
11.0	Demonstrate leadership and effective communication in employee management. The student will be able to:
11.01	Demonstrate punctuality, initiative, courtesy, dependability, flexibility, and honesty.
11.02	Select and hire farm managers who will work with various levels of farm workers, work well in a team environment and care about equine.
11.03	Develop effective oral and written communication skills.
Exercise Physiology	
12.0	Design and manage physiological conditioning programs for the equine athlete. The student will be able to:
12.01	Understand and apply different training/conditioning techniques for various equine athletics.

	12.02 Understand equine biomechanics and how they influence equine performance.
	12.03 Develop optimum conditioning programs to minimize risk of injury to the horse.
13.0	Apply manual therapies for maintenance and therapeutic applications. The student will be able to:
	13.01 Understand different manual therapies that can be applied by non-veterinarians for the health and well-being of the horse.
	13.02 Develop expertise in the application of different manual therapies for the horse.
14.0	Identify and apply rehabilitation techniques using state-of-the-art equipment. The student will be able to:
	14.01 Understand concepts of rehabilitation for horses, including different therapeutic modalities and equipment.
	14.02 Work in a rehabilitation center to gain familiarity with different equipment and rehabilitation strategies.
15.0	Evaluate hoof care, tack, and equipment for different equine athletic endeavors. The student will be able to:
	15.01 Understand different farrier techniques for various equine athletic endeavors.
	15.02 Understand action of bits and hackamores in the control and training of horses.
	15.03 Evaluate saddle fit.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

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- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

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Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates (CCC):

Equine Assistant Management (0101050701) – 24 credit hours
Equine Technician (0101050703) – 15 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Landscape and Horticulture Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101060502
Program Type	College Credit
Program Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction pertaining to an understanding of plant physiology and growth, plant nutrition and fertilization, plant classification and identification, propagation, pest control, pruning and shaping plants, maintenance of landscape plants, drainage and irrigation systems, equipment management, marketing, cultural and environmental management, business management, design, and employability and human relations skills. This program also prepares for certification and licensure as a horticulture professional, landscape technician, or landscape contractor and designer.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate an understanding of plant physiology and growth.
02.0 Classify plants.
03.0 Determine drainage system needs and design a drainage system.
04.0 Select tools and equipment.
05.0 Fertilize plants.
06.0 Manage a pest-control program.
07.0 Prune and shape plants.
08.0 Protect plants and equipment from adverse weather.
09.0 Maintain and analyze records.
10.0 Demonstrate employability skills.
11.0 Demonstrate managerial and supervisory skills.

Horticulture Specialization
12.0 Prepare growing media and seedbeds.
13.0 Propagate plants.
14.0 Grow plants.
15.0 Protect plants and equipment from adverse weather.
16.0 Harvest, process, and ship plants.
17.0 Design horticulture facilities.
18.0 Design nursery irrigation systems.

Landscape Specialization
19.0 Analyze and design the project (landscape and interiorscape).
20.0 Prepare, estimate, and establish contracts.
21.0 Analyze and organize the project.
22.0 Lay out and install landscape.
23.0 Plan and install a drainage system.
24.0 Maintain customer relations and observe follow-up procedures.
25.0 Maintain landscape plants.
26.0 Select landscape tools and equipment.
27.0 Plan and service landscape irrigation systems.

Florida Department of Education
Student Performance Standards

Program Title: **Landscape and Horticulture Technology**
CIP Number: **1101060502**
Program Length: **60 credit hours**

At the completion of this program, the student will be able to:	
01.0	Demonstrate an understanding of plant physiology and growth. The student will be able to:
01.01	Describe the process of photosynthesis.
01.02	Identify and describe the functions of all parts of the plant.
01.03	Describe an asexual reproduction process.
01.04	Explain the differences between angiosperms and gymnosperms.
01.05	Identify the differences between woody and herbaceous plants.
02.0	Classify plants. The student will be able to:
02.01	Identify and group shade and flowering trees.
02.02	Identify and group fruit trees and plants.
02.03	Identify and group annuals, vegetables, and herbs.
02.04	Identify and group woody ornamentals, vines, and ground covers.
02.05	Identify and group tropical foliage plants.
02.06	Identify and group turf and ornamental grasses.
03.0	Determine drainage system needs and design a drainage system. The student will be able to:
03.01	Determine the natural slope/grade of an area.
03.02	Determine the texture and percolation characteristics of the soil.
03.03	Identify techniques for constructing ditches and culverts.
03.04	Direct the movement of water away from structures and installations.

	03.05 Design and underground drainage system.
04.0	Select tools and equipment. The student will be able to:
	04.01 Determine equipment needs for the company.
	04.02 Select equipment for the job.
	04.03 Supervise the service and maintenance of power equipment.
	04.04 Maintain an inventory of parts and supplies.
05.0	Fertilize plants. The student will be able to:
	05.01 Evaluate influences of nutrients on plant growth.
	05.02 Evaluate plants for nutrient deficiencies.
	05.03 Interpret and evaluate the results of soil and leaf tissue analysis.
	05.04 Select appropriate forms of fertilizer to correct nutrient deficiencies.
	05.05 Identify appropriate methods of fertilizer application (dry, liquid, slow-release, injection, etc.).
	05.06 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
	05.07 Measure pH and EC and relate values to nutrient availability.
06.0	Manage a pest-control program. The student will be able to:
	06.01 Develop an integrated pest management program or schedule.
	06.02 Train employees in the safe use of pesticides.
	06.03 Determine pesticide licensure requirements.
07.0	Prune and shape plants. The student will be able to:
	07.01 Train employees in pruning techniques.
	07.02 Develop a pruning program and time schedule.
	07.03 Identify and use tools for pruning.
	07.04 Identify proper pruning techniques and how they effect plant growth.

	07.05 Select plant growth regulators.
	07.06 Demonstrate sanitation and safety practices when pruning.
08.0	Protect plants and equipment from adverse weather. The student will be able to:
	08.01 Monitor and interpret weather forecasts.
	08.02 Supervise procedures for protecting plants and equipment from adverse weather.
	08.03 Compare cost and efficiency of various methods of protecting plants and equipment from adverse weather.
09.0	Maintain and analyze records. The student will be able to:
	09.01 Determine the application of spread sheets in the industry.
	09.02 Maintain fertilizer and pesticide application records.
	09.03 Keep equipment maintenance and service records.
	09.04 Maintain sales and production records.
	09.05 Record labor and personnel information.
	09.06 Keep inventory records.
	09.07 Analyze cost and effectiveness of management practices.
	09.08 Determine plant production cost.
	09.09 Prepare an annual budget.
	09.10 Use computers in the landscape and horticulture operations.
10.0	Demonstrate employability skills. The student will be able to:
	10.01 Conduct a job search.
	10.02 Secure information about a job.
	10.03 Identify documents that may be required when applying for a job.
	10.04 Create a resume and cover letter.
	10.05 Demonstrate competency in job interview techniques.

	10.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other person.
	10.07 Identify acceptable work habits.
	10.08 Demonstrate knowledge of how to make job changes.
11.0	Demonstrate managerial and supervisory skills. The student will be able to:
	11.01 Instruct employees in their tasks.
	11.02 Prepare daily work plans.
	11.03 Enforce safety regulations.
	11.04 Organize and conduct employee training.
	11.05 Evaluate performance of employees.
	11.06 Prepare job descriptions.
	11.07 Conduct job interviews.
	11.08 Demonstrate effective communication skills.
	11.09 Demonstrate computer literacy as related to landscape and horticulture operations.
Horticulture Specialization	
12.0	Prepare growing media and seedbeds. The student will be able to:
	12.01 Identify media materials.
	12.02 Mix rooting and growing media according to plant requirements.
	12.03 Sterilize rooting, potting, and growing media.
	12.04 Collect and test a soil sample from field and potting media.
	12.05 Adjust pH and nutritional levels of media.
	12.06 Prepare planting beds and sites.
	12.07 Fill and level benches and pots with media.
	12.08 Demonstrate sanitation practices when handling and storing plant media materials.

	12.09 Identify appropriate soilless media materials for soilless plant production.
13.0	Propagate plants. The student will be able to:
	13.01 Collect propagation materials at proper time (seeds, cuttings, scions, bulbs, etc.).
	13.02 Demonstrate propagation (grafting, budding, layering, separating, dividing, cutting, and tissue culturing, etc.).
	13.03 Prepare flats and a seedbed and plant seeds.
	13.04 Prepare a rooting bed.
	13.05 Prepare propagation materials (seeds, cuttings, scions, etc.)
	13.06 Apply growth stimulants to propagation materials.
	13.07 Control propagation facility environment (moisture, temperature, light).
	13.08 Transplant rooted propagation materials including tissue culture transplants.
	13.09 Describe advanced propagation techniques (tissue, culture, pre-germination, seed irradiation, tree cuttings).
	13.10 Demonstrate sanitation and safety practices when propagating.
14.0	Grow plants. The student will be able to:
	14.01 Prepare media for containers.
	14.02 Prepare field site for transplants.
	14.03 Select plant containers.
	14.04 Determine plant spacing in the field and on container beds.
	14.05 Transplant propagated materials to various containers and to the field.
	14.06 Determine and provide light requirements of various plant types.
	14.07 Determine water requirements and apply water at proper rates.
	14.08 Identify weeds and apply herbicides.
	14.09 Determine fertilization requirements.
	14.10 Identify insect and insect-like disease problems and apply pesticides.

	14.11 Demonstrate safety practices when applying pesticides.
15.0	Protect plants and equipment from adverse weather. The student will be able to:
	15.01 Monitor and interpret weather forecasts.
	15.02 Supervise procedures for protecting plants and equipment from adverse weather.
	15.03 Compare cost and efficiency of various methods of protecting plants and equipment from adverse weather.
	15.04 List plants according to environmental tolerances (light, temperature, moisture, wind, salt, etc.).
16.0	Harvest, process, and ship plants. The student will be able to:
	16.01 Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger).
	16.02 Demonstrate an understanding of selecting, grading, and assembling container grown plants.
	16.03 Prepare for shipment, loading, and transporting harvested plant materials.
	16.04 Use proper methods for preserving plant viability.
	16.05 Demonstrate safety practices when harvesting, processing, and shipping nursery stock.
17.0	Design horticulture facilities. The student will be able to:
	17.01 Design a facility for propagating plants.
	17.02 Design a bedding-plants growing facility.
	17.03 Design a container growing facility.
	17.04 Design a field growing facility.
	17.05 Design a tropical foliage growing facility.
	17.06 Design a retail facility.
	17.07 Identify different types of soilless growing systems.
18.0	Design nursery irrigation systems. The student will be able to:
	18.01 Determine irrigation requirements.
	18.02 Assess quality of irrigation water.

	18.03 Design and set up an irrigation system for propagation area, greenhouse or enclosed structure, shade house, retail display area, and field-growing area.
	18.04 Operate various types of irrigation systems.
	18.05 Calculate cost efficiency of irrigation system.
Landscape Specialization	
19.0	Analyze and design the project (landscape and interiorscape). The student will be able to:
	19.01 Determine the purpose, problems, or desired effect of the project.
	19.02 Analyze the environmental conditions of the landscape or interiorscape.
	19.03 Determine site analysis problems.
	19.04 Demonstrate working knowledge of Computer-Assisted Drafting (CAD) system.
	19.05 Design hardscape plan.
	19.06 Design and select appropriate plant materials for desired effect and function.
	19.07 Determine the method and form of presentation of the project.
20.0	Prepare, estimate, and establish contracts. The student will be able to:
	20.01 Develop a list of materials required for the project.
	20.02 Determine equipment needs.
	20.03 Estimate time and man hours.
	20.04 Determine cost of materials, equipment, and labor.
	20.05 Prepare a price for customer, based on specifications.
	20.06 Establish terms of a contract.
21.0	Analyze and organize the project. The student will be able to:
	21.01 Interpret plans and specifications.
	21.02 Identify safety requirements.
	21.03 Organize site preparation.

	21.04 Locate project materials.
	21.05 Determine personnel needs.
	21.06 Determine equipment needs.
	21.07 Establish project schedule.
22.0	Lay out and install landscape. The student will be able to:
	22.01 Locate existing utilities.
	22.02 Identify procedures for site specific rough grading.
	22.03 Describe the procedures for constructing a hardscape. (walls, walks, patio, drives, etc.)
	22.04 Identify procedures for lay out and installation of plants.
	22.05 Identify the procedures for preparing an interiorscape.
	22.06 Identify procedures for preparing final grade.
	22.07 Identify procedures for lawn installation.
	22.08 Identify procedures for mulch installation.
	22.09 Identify procedures for preforming final clean up.
23.0	Plan and install a drainage system. The student will be able to:
	23.01 Plan the construction of an underground drainage system.
	23.02 Estimate and order appropriate fill materials.
	23.03 Establish proper elevations and grade a landscape site.
	23.04 Read soil and contour maps.
24.0	Maintain customer relations and observe follow-up procedures. The student will be able to:
	24.01 Conduct walk-through of project with client to ensure satisfaction.
	24.02 Identify current and future maintenance requirements.
	24.03 Analyze project records for profitability and employee performance.

25.0	Maintain landscape plants. The student will be able to:
	25.01 Determine water requirements at proper rates.
	25.02 Identify weeds and appropriate herbicide application.
	25.03 Determine fertilization requirements
	25.04 Regulate growth of landscape plants.
	25.05 Maintain turf viability (mow at proper height and frequency, aerate, edge, clip, and remove trash).
	25.06 Identify plant pest problems and apply corrective measures.
26.0	Select landscape tools and equipment. The student will be able to:
	26.01 Determine equipment needs for the company.
	26.02 Select equipment for the job.
	26.03 Instruct and supervise employees in the safe use of tools and equipment.
	26.04 Maintain an inventory of parts and supplies.
27.0	Plan and service landscape irrigation systems. The student will be able to:
	27.01 Determine irrigation requirements.
	27.02 Assess quality of irrigation water.
	27.03 Plan an irrigation system.
	27.04 Supervise the installation of irrigation equipment.
	27.05 Operate and service low-volume irrigation system.
	27.06 Operate and service overhead irrigation system.
	27.07 Operate and maintain automatic system.
	27.08 Calculate cost efficiency of an irrigation system.
	27.09 Design and underground drainage system.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates (CCC):

Landscape and Horticulture Professional (0101060504) – 18 credit hours
Landscape and Horticulture Specialist (0101060503) – 12 credit hours
Landscape and Horticulture Technician (0101060505) – 30 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Golf Course Operations**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101060701
Program Type	College Credit
Program Length	69 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to supervise and manage the operations of a golf course. Instruction includes equipment management, pest control, fertilization, care, irrigation, record keeping, safety, laws, and regulations, as well as leadership, public relations, human relations, employability and communication skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 69 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Supervise and manage the operation, maintenance, and repair of golf course equipment.
02.0 Schedule irrigation and manage the design, installation, and maintenance of golf course irrigation systems.
03.0 Prescribe, supervise, and manage the application of agricultural chemicals for the prevention and control of pests.
04.0 Prescribe, supervise, and manage the fertilization of turf and landscape.
05.0 Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs, and other areas.
06.0 Provide a safe environment for workers and patrons.
07.0 Keep and analyze maintenance, employee, equipment, and inventory records.
08.0 Analyze and incorporate technical information into management practices.
09.0 Observe local, state, and federal laws and regulations.
10.0 Demonstrate leadership, communication, public relations, employability, and human relations skills.

Florida Department of Education
Student Performance Standards

Program Title: **Golf Course Operations**
CIP Number: **1101060701**
Program Length: **69 credit hours**

At the completion of this program, the student will be able to:	
01.0	Supervise and manage the operation, maintenance and repair of golf course equipment. The student will be able to:
01.01	Define the role of the golf course equipment mechanic in relation to the organization.
01.02	Determine the essential power, shop and hand tools required in a golf course mechanics shop.
01.03	Design a shop layout.
01.04	Compile a list of equipment required in the operation of an 18-hole golf course.
01.05	Demonstrate knowledge and use of golf course equipment.
01.06	Develop and supervise a system of preventive maintenance.
01.07	Sharpen and grind blades and cutting surfaces on all mowing equipment.
01.08	Trouble-shoot and repair golf course equipment.
01.09	Demonstrate gas and electric arc welding techniques on golf course equipment.
01.10	Compile, stock and manage a parts inventory.
01.11	Monitor and record the use of fuel, lubricants, and consumable shop supplies.
01.12	Maintain a safe clean shop.
01.13	Maintain current catalogs and online resources for supplies and equipment.
01.14	Maintain tires and tire pressure on golf course equipment.
01.15	Train and supervise employees in the safe use of tools and equipment.
02.0	Schedule irrigation and manage the design, installation and maintenance of golf course irrigation systems. The student will be able to:
02.01	Determine water requirements for a particular turf.

	02.02 Analyze soil textures regarding their moisture holding capacities.
	02.03 Analyze yearly, monthly, and weekly rainfall amounts and distribution in various areas of Florida.
	02.04 List the major water sources for irrigation purposes.
	02.05 Operate and maintain hydraulically controlled, electrically controlled, and thermo-hydraulically controlled irrigation valves.
	02.06 Select and operate pumps used in sprinkler irrigation systems.
	02.07 Illustrate the design, computations, pumping capacity, and pipe sizing needed to irrigate a given operation.
	02.08 Prepare a schedule for maintaining an irrigation system.
	02.09 Schedule irrigation as required.
	02.10 Manage drainage and run-off of excess rainfall.
03.0	Prescribe, supervise, and manage the application of agricultural chemicals for the prevention and control of pests. The student will be able to:
	03.01 Store and handle chemicals safely.
	03.02 Recognize symptoms of agricultural chemical poisoning and apply first aid.
	03.03 Dispose of chemical containers.
	03.04 Read and interpret safety precautions provided on equipment and pesticide containers.
	03.05 Instruct employees in the safe use of agricultural chemicals.
	03.06 Select and check personal safety equipment.
	03.07 Prepare proper proportions of chemicals and carrying agents.
	03.08 Check application equipment for malfunction and wear.
	03.09 Compute amounts of active ingredients of chemicals to be used.
	03.10 Calibrate volume, pressure, and output of equipment.
	03.11 Weigh and measure chemicals.
	03.12 Adjust height and width of equipment to achieve desired spray pattern.
	03.13 Recognize symptoms of pesticide damage.

	03.14 Identify fungi and bacteria.
	03.15 Recognize symptoms of insects and nematodes.
	03.16 Identify common insects, weeds, diseases, and other pests common to golf courses.
	03.17 Clean and store sprayers.
	03.18 Develop a pest control management program following best management practices.
04.0	Prescribe, supervise, and manage the fertilization of turf and landscape. The student will be able to:
	04.01 Take soil and leaf samples for chemical analysis.
	04.02 Adjust pH level of soil.
	04.03 Interpret soil and tissue chemical analysis results.
	04.04 Apply fertilizer in liquid form.
	04.05 Interpret labels on fertilizer containers.
	04.06 Apply dry fertilizers.
	04.07 Identify nutrient deficiency symptoms in turf and landscape plants.
	04.08 Determine kind and type of fertilizer to apply to a given area.
	04.09 Determine the nutrient requirements of various plants.
	04.10 Determine amount of fertilizer to apply to a given area.
	04.11 Analyze cost of various formulations and methods of application.
	04.12 Recognize fertilizer injury to plant materials.
05.0	Train and supervise employees in grooming and maintaining greens, tees, fairways, roughs, and other areas. The student will be able to:
	05.01 Supervise the mowing of greens, collars, roughs, aprons, and fairways.
	05.02 Determine the placement and location of cups and tees.
	05.03 Supervise the repair of divots.
	05.04 Determine conditions necessary for verticuting and aerifying turf.

	05.05 Supervise the care and maintenance of sand traps.
	05.06 Prune trees and shrubs.
	05.07 Supervise the maintenance of water hazards.
	05.08 Develop maintenance schedule for grooming golf courses.
	05.09 Train and supervise employees in the care of golf courses.
	05.10 Follow written and verbal instructions.
06.0	Provide a safe environment for workers and patrons. The student will be able to:
	06.01 Provide instruction for the safe use of chemicals, tools, and equipment.
	06.02 Inspect tools and equipment for safe operation.
	06.03 Apply emergency first aid.
	06.04 Post safety hazards.
	06.05 Monitor employees work habits.
	06.06 Maintain safety awareness.
07.0	Keep and analyze maintenance, employee, equipment, and inventory records. The student will be able to:
	07.01 Maintain equipment use and maintenance records.
	07.02 Keep and file personnel records and information.
	07.03 Record and analyze time-on-task information.
	07.04 Maintain pesticide use information.
	07.05 Keep inventory records.
	07.06 Prepare a written report or summary based on records.
	07.07 Observe and make recommendations based on records.
	07.08 Evaluate employees, equipment and practices based on records.
	07.09 Develop annual budget for complete operation.

	07.10 Keep and file guarantees, warrantees, service contracts and operators manuals.
08.0	Analyze and incorporate technical information into management practices. The student will be able to:
	08.01 Maintain a current file of technical information.
	08.02 Update skills and knowledge through workshops and seminars.
	08.03 Analyze data relative to operation.
	08.04 Assess new materials, chemicals and procedures based on research or technical information.
	08.05 Interpret technical information relative to operation.
09.0	Observe local, state and federal laws and regulations. The student will be able to:
	09.01 Observe OSHA rules and regulations.
	09.02 Observe EPA rules and regulations.
	09.03 Secure and maintain permits, certificates, and licenses appropriate to operation.
	09.04 Observe stream and groundwater regulations.
	09.05 Recognize responsibilities and liabilities of occupation or position.
	09.06 Maintain a list of agencies responsible for regulating the industry.
10.0	Demonstrate leadership, communication, public relations, employability, and human relations skills. The student will be able to:
	10.01 Conduct a job search.
	10.02 Secure information about a job.
	10.03 Identify documents that may be required when applying for a job.
	10.04 Complete a job application form correctly.
	10.05 Demonstrate competence in job interview techniques.
	10.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
	10.07 Identify acceptable work habits.
	10.08 Demonstrate knowledge of how to make job changes appropriately.

10.09 Demonstrate acceptable employee health habits.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Zoo Animal Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101099901
Program Type	College Credit
Program Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to instruction that prepares individuals to supervise and coordinate the activities of workers engaged in the care and exhibition of birds and animals. Subject matter also includes safety, diseases, and parasites, feeding and nutrition, maintenance and repair, animal behavior, as well as leadership, communications, employability, human and public relations skills.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 66 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Prevent, treat, and control diseases and parasites of animals.
02.0 Demonstrate interpretation and guest service skills.
03.0 Develop and maintain Animal Management Techniques
04.0 Manage animal nutrition and feeding.
05.0 Operate and maintain instruments and equipment.
06.0 Provide first aid for animals.
07.0 Collect laboratory specimens.
08.0 Analyze and keep records.
09.0 Manage animal, visitor, and worker safety.
10.0 Identify animal species.
11.0 Interpret and observe laws, rules, and regulations relative to operation.
12.0 Dispense medicine and supplies.
13.0 Manage, maintain, and repair facilities.
14.0 Demonstrate leadership, employability, communication, human and public relations skills.
15.0 Observe and interpret animal behavior.

Florida Department of Education
Student Performance Standards

Program Title: **Zoo Animal Technology**
CIP Number: **1101099901**
Program Length: **66 credit hours**

At the completion of this program, the student will be able to:	
01.0	Prevent, treat and control diseases and parasites of animals. The student will be able to:
01.01	Observe animals daily for symptoms of disease and parasites.
01.02	Recognize signs of disease requiring the quarantine or isolation of animals.
01.03	Vaccinate animals.
01.04	Provide special nutritional care for animals as required.
01.05	Maintain a quarantine program for new animal populations.
01.06	Perform pest control program.
01.07	Differentiate and treat trauma, nutritional disorders, infections, poisoning, zoonotic and genetic diseases.
01.08	Properly handle mortality cases for disposal or necropsy.
01.09	Practice basic cleanliness and orderliness in and around animal enclosures.
01.10	Identify specific sanitation procedures applicable to managing the collection and the various situations they would be used: quarantine, medical building, kitchen, public areas, storage buildings.
01.11	Properly dispose of animal waste, used food items and plant material.
02.0	Demonstrate interpretation and guest service skills. The student will be able to:
02.01	Handle guest questions and situations.
02.02	Interact with zoo guests in a positive and enthusiastic manner.
02.03	Understand their audience based on age, interest level and learning style.
02.04	Communicate appropriately to all audiences.
02.05	Uses and understands interpretative techniques.

	02.06 Demonstrate passion and professionalism.
	02.07 Create and deliver oral presentations.
	02.08 Interpret zoo policies to non-zoo staff.
03.0	Develop and maintain Animal Management Techniques. The student will be able to:
	03.01 Maintain environmental conditions required by species.
	03.02 Provide pre-natal and post-partum care for animals.
	03.03 Facilitate the breeding of various species.
	03.04 Identify and use techniques and equipment for the capture and restraint of animals.
	03.05 Identify circumstances justifying the capture and restraint of animals.
	03.06 Transport animals safely.
	03.07 Accurately collect and record various animal measurements.
04.0	Manage animal nutrition and feeding. The student will be able to:
	04.01 Identify and feed appropriate plant material.
	04.02 Prepare and dispense appropriate diets to maintain various species in captivity.
	04.03 Properly store, inventory, and maintain animal food supplies.
	04.04 Recognize the need to adjust animal diets based on various factors such as breeding season, environmental changes, census changes and life stage.
	04.05 Present food to animals in the appropriate manner.
	04.06 Understand basic nutritional requirements of various animal species in the wild and in captivity.
05.0	Operate and maintain instruments and equipment. The student will be able to:
	05.01 Operate and maintain scales and balances.
	05.02 Identify, operate, and maintain clinical instruments.
	05.03 Use and maintain capture and restraint equipment.
	05.04 Operate communications equipment.

	05.05 Identify and safely use hand and power tools.
06.0	Provide first aid for animals. The student will be able to:
	06.01 Identify injuries requiring first aid and provide emergency treatment.
	06.02 Prepare and maintain first aid equipment and supplies.
	06.03 Identify injuries requiring services of a veterinarian.
07.0	Collect laboratory specimens. The student will be able to:
	07.01 Collect urine specimens.
	07.02 Collect fecal specimens.
	07.03 Collect environmental samples.
	07.04 Properly package and handle specimens for shipment or analysis.
08.0	Analyze and keep records. The student will be able to:
	08.01 Keep exhibit maintenance records.
	08.02 Keep personnel records.
	08.03 Keep and maintain animal medical records.
	08.04 Keep record of animal feeding and diet.
	08.05 Maintain animal behavioral records.
	08.06 Keep records of chemical, pesticide and medication use.
09.0	Manage animal, visitor, and worker safety. The student will be able to:
	09.01 Maintain the safety of animals.
	09.02 Manage and maintain safety of visitors.
	09.03 Handle animals in a safe and cautious manner.
	09.04 Operate tools and equipment in a safe manner.
	09.05 Prepare for and respond to emergencies.

10.0	Identify animal species. The student will be able to:
	10.01 Classify animals according to habitat and nutritional requirements.
	10.02 Recognize morphological characteristics of major animal groups.
	10.03 Identify animals to genus and species.
	10.04 Identify species of animals in specific collections.
11.0	Interpret and observe laws, rules and regulations relative to operation. The student will be able to:
	11.01 Observe local, state, federal and international laws, and regulations.
	11.02 Maintain facilities up to standards of licenses, certificates, bonds, and permits.
	11.03 Describe the regulation process.
	11.04 Identify agencies regulating the profession.
	11.05 Identify agencies accrediting the facility.
12.0	Dispense medicine and supplies. The student will be able to:
	12.01 Follow verbal and written instructions when administering medications.
	12.02 Interpret instructions and warnings on the labels of medicines and chemicals.
	12.03 Maintain security of medicines and chemicals.
	12.04 Identify medicines and chemicals commonly used in the profession.
	12.05 Carefully mix, measure, and dispense medications.
	12.06 Maintain inventory of supplies and medications.
13.0	Manage, maintain, and repair facilities. The student will be able to:
	13.01 Maintain grounds, facilities and exhibits according to master plan.
	13.02 Operate grounds keeping equipment.
	13.03 Paint wood, metal, and masonry surfaces.
	13.04 Perform repairs on wooden structures.

	13.05 Observe safety precautions.
14.0	Demonstrate leadership, employability, communication, human and public relations skills. The student will be able to:
	14.01 Conduct a job search.
	14.02 Secure information about a job.
	14.03 Identify documents that may be required when applying for a job.
	14.04 Complete a job application form correctly.
	14.05 Demonstrate competence in job interview techniques.
	14.06 Respond positively to criticism from employer, supervisor, or other persons.
	14.07 Establish acceptable work habits: communication, time management, awareness, appropriate initiative, and responsibility
	14.08 Practice acceptable employee health habits.
15.0	Observe and interpret animal behavior. The student will be able to:
	15.01 Recognize animal breeding behavior.
	15.02 Provide appropriate breeding environment for animals.
	15.03 Identify behavior of pre and post parturition animals.
	15.04 Describe behavioral changes due to aging.
	15.05 Recognize normal behavioral characteristics of animals through observations.
	15.06 Identify behavioral problems.
	15.07 Describe training of animals and correction of behavior problems.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Florida Department of Education
Curriculum Framework

Program Title: **Marine Environmental Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1103060101
Program Type	College Credit
Program Length	60 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

This degree is designed to prepare students for a diverse set of employment opportunities in the field of marine environmental technology and other marine-oriented careers. During the program students will acquire the skills and knowledge necessary to enter the work force in a variety of marine oriented careers including technicians at environmental or research laboratories, environmental consulting industries, aquaculture/mariculture facilities, ecotourism, or marine conservation and restoration projects.

The purpose of this program is to provide technician level training and supply skilled employees for the growing workforce demand in marine related environmental industries. Graduates of this program will obtain the fundamental academic skills necessary to be successful at the technician level and demonstrate an understanding of the fundamental concepts behind marine environmental science. Graduates will demonstrate the ability to: (1) collect marine related data above and below the water (i.e. on scuba), (2) write technical reports, (3) navigate and operate marine vessels, and (4) understand basic business and management concepts.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

Marine Environmental Technology Core

01.0 Demonstrate proficiency in underwater scientific research and marine data collection methods.
02.0 Demonstrate an understanding of the basic knowledge and practices that form the foundation of the marine sciences.
03.0 Compose scientific and/or technical reports.
04.0 Demonstrate basic knowledge and skills necessary to operate and maintain marine vessels.
05.0 Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation.
06.0 Demonstrate an understanding of the fundamental principles of biology.
07.0 Comprehension of fundamental principles governing business and entrepreneurship.
08.0 Demonstrate an understanding of the fundamental principles of marine aquaculture.

Marine Assessment and Restoration Specialization

09.0 Demonstrate a basic knowledge and understanding of specific marine habitat assessment protocols.
10.0 Demonstrate a basic knowledge and understanding of several marine habitat restoration protocols.

Marine Mammal Specialization

11.0 Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution.
12.0 Demonstrate basic knowledge of marine mammal social structure and culture.
13.0 Demonstrate proficiency of basic marine mammal training and husbandry techniques.
14.0 Demonstrate knowledge of principle marine mammal laws and regulations.
15.0 Describe and discuss research focused on marine mammals.
16.0 Demonstrate knowledge of conservation issues involving marine mammals
17.0 Demonstrate an understanding of the guiding principles and practices of marine mammals in human care.
18.0 Implement the skills and knowledge to interpret a live animal presentation for an audience.
19.0 Conduct an informal presentation on social structure, behavior, learning, and conservation threats.
20.0 Effectively connect an audience to a live marine mammal to influence personal conservation behavior.

Marine Aquaculture Specialization

21.0 Demonstrate a thorough knowledge of aquaculture best management practices including mitigating environmental impacts.
22.0 Identify and diagnose common diseases and parasites that infect marine aquaculture organisms.
23.0 Demonstrate a moderate understanding of marine aquaculture systems.
24.0 Recognize appropriate nutritional requirements for the most common marine aquaculture organisms.
25.0 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.

Florida Department of Education
Student Performance Standards

Program Title: **Marine Environmental Technology**
CIP Number: **1103030101**
Program Length: **60 credit hours**

At the completion of this program, the student will be able to:	
Marine Environmental Technology Core	
01.0	Demonstrate proficiency in underwater scientific research and marine data collection methods. The student will be able to:
01.01	Demonstrate knowledge and competence at research diving techniques and procedures to support scientific research projects.
01.02	Demonstrate the use of transects and quadrats to quantify the distribution and abundance of sessile marine organisms within a defined research area.
01.03	Demonstrate methods for conducting quantitative surveys including the distribution and abundance of fishes within a defined research area.
01.04	Demonstrate state-of-the-art underwater data collection, recording and preservation procedures necessary to support biological and archaeological research.
01.05	Demonstrate the basic knowledge necessary to conduct statistical analysis of the scientific data collected.
01.06	Synthesize what was learned about research diving and other data collection techniques through a presentation, project, or case study.
01.07	Demonstrate proper dive planning and safety procedures.
01.08	Demonstrate emergency procedures including first aid, CPR, and oxygen administration.
01.09	Demonstrate knowledge of principle regulatory requirements (e.g., permitting).
02.0	Demonstrate an understanding of the basic knowledge and practices that form the foundation of the marine sciences. The student will be able to:
02.01	Define plate tectonic theory and distinguish between types of plate boundaries.
02.02	Illustrate the features of the sea floor that arise from tectonic activity.
02.03	Identify key oceanographic terms and apply them in discussion.
02.04	Describe the processes that created the earth and the ocean.
02.05	Explain how the physical and chemical properties of seawater are important in understanding the ocean.

	02.06 Compare the physical, chemical and biological processes that affect the origin, transport and deposition of sediment.
	02.07 Summarize the role of the ocean in weather and climate.
	02.08 Explain the mechanisms that create both surface and sub-surface ocean currents.
	02.09 Define four types of ocean waves and identify the forces that generate them.
	02.10 Explain how the ocean determines the shape, features and composition of the coast line.
	02.11 Describe the Scientific Method and explain the nature and limitations of scientific investigation.
	02.12 Recognize and explain the basic features that define and differentiate major marine phyla.
	02.13 Describe the role of microbes in the ocean.
	02.14 Describe the major anatomical features and physiologic systems of bony and cartilaginous fishes.
	02.15 Explain the functional role of marine invertebrates, reptiles, seabirds, and mammals in the marine environment.
03.0	Compose scientific and/or technical reports. The student will be able to:
	03.01 List the typical components of a peer-reviewed scientific article.
	03.02 Explain the peer-review process of publishing a scientific article.
	03.03 Explain the function of each section of a scientific paper, presentation, or technical report.
	03.04 Critically analyze a scientific paper describing its thesis, methods, results, and conclusions.
	03.05 Create at least one report and presentation formatted according to a scientific publishing format.
04.0	Demonstrate basic knowledge and skills necessary to operate and maintain marine vessels. The student will be able to:
	04.01 Demonstrate coastwise navigation techniques using both dead reckoning and electronic methods.
	04.02 Demonstrate competence at using basic knots and marlinspike skills.
	04.03 Demonstrate mastery of the navigational “Rules of the Road” through the safe operation of a small vessel.
	04.04 Demonstrate proper man-overboard recovery procedures.
	04.05 Explain the concepts of stability, trim and hull form as they relate to vessel operation.
	04.06 Demonstrate basic safe boat handling skills.

	04.07 Demonstrate proper procedures for docking, anchoring, rafting, and mooring a vessel.
	04.08 Explain the appropriate response to vessel emergencies such as stranding, fire and damage containment.
	04.09 Demonstrate proper marine radio operating procedures.
	04.10 Demonstrate the ability to perform basic marine vessel maintenance.
05.0	Demonstrate an understanding of marine ecosystems, environmental management, and resource conservation. The student will be able to:
	05.01 Explain the essential components of ecology, and how energy flows through an ecosystem.
	05.02 Explain the functional role of primary producers in the marine environment and identify common species of marine plants and algae.
	05.03 Explain the essential components of intertidal ecology, and how energy flows through various types of intertidal ecosystems.
	05.04 Describe the features and functional systems in the intertidal, neritic, epipelagic, and deep ocean regions.
	05.05 Explain the basic functional ecology and energy flow on a coral reef.
	05.06 List the various resources humans derived from the sea and what problems this presents.
	05.07 Explain how humankind has and continues to impact the marine environment.
	05.08 Describe methods and best practices currently in use to conserve marine ecosystems including but not limited to as marine spatial planning, integrated coastal zone management and marine protected areas.
	05.09 Explain the concepts of “Tragedy of the Commons” and “Precautionary Principle” as they relate to marine ecosystem and resource conservation.
06.0	Demonstrate an understanding of the fundamental principles of biology. The student will be able to:
	06.01 Describe the requirements/ingredients of life, its associated “machinery” and the special challenges of living in the sea.
	06.02 Identify biological processes including photosynthesis/chemosynthesis, respiration, and homeostasis.
	06.03 Explain the basic structure, growth, metabolism, reproduction, physiology, and genetics of cells and organisms.
	06.04 Recognize evolutionary relationships and diversity among living organisms and appreciate the importance of biodiversity.
	06.05 Explain the characteristics and distinctive features of the domains and kingdoms of life.
	06.06 Identify and classify organisms within major taxonomic groups.
	06.07 Demonstrate basic biological laboratory techniques including the use of a microscope.

	06.08 Interpret laboratory data and summarize the results.
	06.09 Demonstrate the problem solving and critical thinking skills needed to assess and solve biologically based questions.
07.0	Comprehension of fundamental principles governing business and entrepreneurship. The student will be able to:
	07.01 Demonstrate a familiarity of entrepreneurship by understanding the characteristics and mindset of entrepreneurs.
	07.02 Identify and evaluate opportunities within the marketplace, both for new venture creation and within existing organizations.
	07.03 Create the tools necessary to act on an entrepreneurial opportunity by writing a business plan, building a management team, financing the opportunity, and creating an innovative marketing plan.
	07.04 Describe successful strategies and common mistakes made by successful entrepreneurs.
	07.05 Describe the legal requirements and obstacles in starting a business venture.
08.0	Demonstrate an understanding of the fundamental principles of marine aquaculture. The student will be able to:
	08.01 Demonstrate a basic understanding of marine aquaculture husbandry principles and practices.
	08.02 Demonstrate the skills required to culture phytoplankton and zooplankton required for larval rearing.
	08.03 Describe the basic types of marine aquaculture systems.
	08.04 Describe the various types of common organisms and techniques currently used during marine aquaculture operations.
	08.05 Demonstrate a basic knowledge of common diseases and parasites during marine aquaculture and methods for their control.
Marine Assessment and Restoration Specialization	
09.0	Demonstrate a basic knowledge and understanding of specific marine habitat monitoring and assessment protocols. The student will be able to:
	09.01 Describe specific marine habitat monitoring and assessment methods.
	09.02 Demonstrate a basic understanding of biodiversity concepts, monitoring and assessment methods.
	09.03 Identify and quantify marine organisms in specific marine habitats.
	09.04 Perform successful marine habitat assessments.
	09.05 Describe the value of monitoring and assessment programs beyond their implementation.
10.0	Demonstrate a basic knowledge and understanding of several marine habitat restoration protocols. The student will be able to:

10.01	Understand the criteria used to identify areas where habitat restoration is required.
10.02	Describe specific marine habitat restoration methods.
10.03	Obtain (e.g., culture) organisms for restoration.
10.04	Perform successful marine habitat restorations.
10.05	Describe the necessity of monitoring restoration programs beyond their implementation.
Marine Mammal Specialization	
11.0	Demonstrate an understanding of the fundamental principles of marine mammal anatomy and evolution. The student will be able to:
11.01	Demonstrate an understanding of the external and internal aspects of dolphin anatomy and physiology, and their role in the successful survival of a mammal in the marine environment.
11.02	Demonstrate knowledge of the anatomy and evolution of various marine mammals including other cetaceans, pinnipeds and sirenians.
11.03	Demonstrate knowledge of the evolution of marine mammals.
12.0	Demonstrate basic knowledge of marine mammal social structure and culture. The student will be able to:
12.01	Demonstrate an understanding of basic dolphin or other marine mammal ecology as related to communication, foraging, reproduction, calf rearing, and social structure.
12.02	Explain and outline marine mammal maternal characteristics, behaviorism human care and the wild, as well as prenatal care, birthing situations and maternity care of mother and neonate human care facilities.
12.03	Explain the natural social ecology of dolphins or other marine mammals and the importance and impact of it on how they are managed at a human care facility.
12.04	Demonstrate an understanding of the basic social structure of other representative marine mammal taxa.
12.05	Demonstrate how the term “culture” has been theorized to apply to certain aspects of cetacean societies and how that impacts our understanding of their cognition.
12.06	Understand the portrayal of marine mammals in the media and how and why it has changed over time.
12.07	Understand the application of animal assistance to humans throughout history and the more recent use of marine mammals in military service and how the latter has greatly contributed to our essential knowledge base of marine mammals overall.
13.0	Demonstrate proficiency of basic marine mammal training and husbandry techniques. The student will be able to:
13.01	Understand the philosophy and techniques of operant (behavioral) conditioning, with a focus on positive reinforcement and relationship-based training, in training behavior and its application to working with dolphins or other marine mammals.
13.02	Demonstrate operant conditioning techniques through the use of learned hand signals in communicating requests for various trained behaviors from the dolphin or other marine mammal.

13.03	Apply skills learned in animal care, handling and reinforcement during a live animal presentation for the general public.
13.04	Construct a plan for basic marine mammal care, dietary and medical needs, and animal handling.
13.05	Understand the medical issues unique to marine mammals, methods of treatment of bacterial, viral, fungal, and parasitic disease, established preventive care practices.
13.06	Demonstrate the use of operant conditioning in training a new behavior through outlining, developing, implementing and modifying a behavior chain through practical application with the animals.
13.07	To summarize the importance of voluntary medical behavior training, concepts and techniques used to desensitize animals to non-invasive medical equipment and procedures. Understand the importance of the trainer/animal relationship with regard to properly maintaining the health and well being of the animals.
13.08	To investigate and understand the purpose and necessity of animal enrichment including cognitive, development, and social aspects. Design and implement enrichment activities to enhance the habitat and activities of the animals.
13.09	To summarize safety precautions and the social issues surrounding enrichment devices, habitat design, safety, maintenance, social groupings, nutrition, training, and energetics of dolphins or other marine mammals.
13.10	To critique various career pathways and opportunities available in the field of marine mammal care and training, including necessary academics, field experience, trainer forums, further experiential education in the field, networking, etc.
14.0	Demonstrate knowledge of principle marine mammal laws and regulations. The student will be able to:
14.01	Understand and explain the laws and regulating agencies, and their evolution, designed to protect marine mammals in both the wild and human care as well as regulate facilities.
14.02	Understand the separate roles of both NOAA and the Department of Agriculture and how they impact marine mammals and marine mammal facilities.
15.0	Describe and discuss research focused on marine mammals. The student will be able to:
15.01	Describe the historical and current research efforts relating to dolphin or other marine mammal cognition, behavior, acoustics, communication, strandings, physiology, reproduction, and conservation.
15.02	Summarize basic medical procedures and the importance and implications of husbandry techniques to marine mammal research.
15.03	Explain how research with dolphins or other marine mammals in human care have expanded our understanding of their wild cousins and contributed to their conservation.
15.04	Summarize trends in basic dolphin or other marine mammal ethology, past and ongoing studies related to cognition, behavior and communication and its application in research, as well as an understanding of passive observational data collection and facilitation of active cognitive research.
15.05	Evaluate theories and research on echolocation and whistle production; implication of anthropogenic noise in the marine environment and ongoing research in the area.
15.06	Conduct independent behavioral observations.
15.07	Review research design and logistics as it applies to marine mammals in human care through a project design exercise conducted collaboratively throughout the course, including an understanding of results analyses and interpretation.

	15.08 Critique career pathways and requirements toward becoming a marine mammal research scientist in human care settings (*ex situ*) and in the field (*in situ*).
16.0	Demonstrate knowledge of conservation issues involving marine mammals. The student will be able to:
	16.01 Understand the current conservation issues of international/domestic concern which affect marine mammals and their environment, cumulative impacts both natural and human induced, as well as ways in which individuals can affect the environment in a positive manner to conserve the species.
	16.02 Master the skills in synthesizing new information and experiences with prior conceptions of dolphins or other marine mammals and the marine environment to clearly refine their opinions and knowledge base.
	16.03 Outline the organization of the Marine Mammal Stranding Network; procedures used in assisting and rehabilitating stranded marine mammals; international and domestic issues concerning threats to dolphins or other marine mammals and the marine environment.
	16.04 List anthropogenic effects on marine mammals and their environment, and demonstrate an understanding of research needed in this area, implications of impacts and associated research.
	16.05 Understand past and present state of whaling operations around the world and the processes and organizations that govern these activities.
	16.06 Understand status of certain endangered marine mammal species and conservation measures to sustain their populations.
17.0	Demonstrate an understanding of the guiding principles and practices of marine mammals in human care. The student will be able to:
	17.01 To diagram population management, including theories, tools and strategies for maintaining a population's genetic diversity and demographic stability in order to ensure its long-term persistence.
	17.02 Summarize specific concerns surrounding appropriate design, construction, and maintenance of aquatic mammal habitats for marine mammals in human care.
18.0	Implement the skills and knowledge to interpret a live animal presentation for an audience. The student will be able to:
	18.01 Explain in detail what makes an effective live animal presentation.
	18.02 Effectively assess audience demographics and adapt to their needs.
	18.03 Effectively read, understand, and generate the audience's interest.
	18.04 Clearly interpret animal behavior for a live audience.
19.0	Conduct an informal presentation on social structure, behavior, learning, and conservation threats. The student will be able to:
	19.01 Effectively assess audience demographics and adapt to their needs.
	19.02 Effectively read, understand, and generate the audience's interest.
	19.03 Appropriately select educational information.
20.0	Effectively connect an audience to a live marine mammal to influence personal conservation behavior. The student will be able to:

	20.01 Connect to the audience and maintain their attention.
	20.02 Communicate interesting aspects of the animal's personality and unique qualities to enable audience members to personally relate to the animal.
	20.03 Suggest simple personal solutions that lead to conservation behavior (e.g., refusing single-use plastics, obeying the US Marine Mammal Protection Act, etc.) that positively impacts the marine environment.
Marine Aquaculture Specialization	
21.0	Demonstrate a thorough knowledge of aquaculture best management practices including mitigating environmental impacts. The student will be able to:
	21.01 Describe the concept of aquaculture Best Management Practices.
	21.02 Compile and analyze marine aquaculture industry management data (e.g., water quality parameters, economic data).
	21.03 Identify and demonstrate proper use of key Quality Management tools.
	21.04 Develop and implement the key components and concepts of an aquaculture management plan.
	21.05 Identify potential environmental impacts and measures to mitigate them.
22.0	Demonstrate a basic understanding of marine aquaculture husbandry principles and practices. The student will be able to:
	22.01 Identify the principles of water quality specific to marine aquaculture for a variety of marine taxa.
	22.02 Demonstrate a working knowledge of variety of husbandry techniques for most of the known marine species currently being cultured, including temperature and photoperiod control conducive to spawning and species specific life styles.
	22.03 Understand basic selective breeding techniques for enhanced phenotypic traits.
23.0	Identify and diagnose common diseases and parasites that infect marine aquaculture organisms. The student will be able to:
	23.01 Demonstrate an understanding of the basic principles of disease in marine aquatic systems.
	23.02 Identify the differences between environmental, viral, bacterial, parasitic, and fungal diseases of marine species.
	23.03 Demonstrate a basic understanding of methodologies for treatment of diseases commonly encountered during marine aquaculture operations.
	23.04 Demonstrate an understanding of the basic principles of marine aquatic health management and biosecurity.
24.0	Demonstrate a moderate understanding of marine aquaculture systems and design. The student will be able to:
	24.01 Describe the various types of marine aquaculture systems and demonstrate the ability to distinguish the primary components of specific marine aquaculture systems.
	24.02 Identify which systems are best for the culture and business model of the target species.

	24.03	Recognize the system requirements for Integrated Multi-Trophic Aquaculture (IMTA) systems.
	24.04	Demonstrate an understanding of the impacts of specific marine aquaculture systems on the environment and especially marine ecosystems.
	24.05	Demonstrate basic skills for computer automated drafting.
25.0	Recognize appropriate nutritional requirements for the most common marine aquaculture organisms. The student will be able to:	
	25.01	Recognize basic marine nutrient and biochemical energy fluxes (i.e., trophodynamics and bioenergetics) especially as they relate to species commonly associated with marine aquaculture.
	25.02	Demonstrate a rudimentary understanding of biochemistry (e.g., proteins, lipids, carbohydrates, etc.) and nutrient metabolism in common marine aquaculture species.
	25.03	Demonstrate an understanding of the metabolic role of vitamins and minerals and recognize symptoms of vitamin deficiency.
	25.04	Recognize appropriate feeding management practices based on metabolic requirements of marine aquaculture target species.
	25.05	Recognize the impacts of feeding strategies on the environment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experience, practicum, or cooperative experience. Whenever the cooperative method of instruction is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; a work station which reflects equipment, skills and tasks which are relevant to the occupation which the student has chosen as a career goal. The student may receive compensation for work performed.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates(CCC):

Marine Mammal Behavior and Training (0101050501) – 15 credit hours
Tropical Ornamental Mariculture Technician (0101030304) – 30 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Veterinary Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1301830100
Program Type	College Credit
Program Length	73 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to animal office procedure; animal pharmacy and pharmacology; animal examination room/area; animal surgical preparation and assisting; large and small animal nursing; laboratory animal procedures; animal radiology, and employability skills. The curriculum also includes general course material such as computer literacy and use, applied mathematics, biological science, communications skills, fundamentals of microbiology, and humanities or liberal arts.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 73 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Participate in facility management utilizing traditional and electronic media and appropriate veterinary medical terminology and abbreviations.
02.0 Communicate in a professional manner in all formats - written, oral, non-verbal, and electronic.
03.0 Follow and uphold applicable laws and the veterinary technology profession's ethical codes to provide high quality care to patients.
04.0 Safely and effectively administer prescribed drugs to patients.
05.0 Accurately dispense and explain prescribed drugs to clients.
06.0 Demonstrate and perform patient assessment techniques in a variety of animal species.
07.0 Understand and demonstrate husbandry, nutrition, therapeutic and dentistry techniques appropriate to various animal species.
08.0 Safely and effectively manage and maintain patients in all phases of anesthesia.
09.0 Safely and effectively select, utilize, and maintain anesthetic delivery and monitoring instruments and equipment.
10.0 Understand and integrate all aspects of patient management for common surgical procedures in a variety of animal species.
11.0 Understand and provide the appropriate instruments, supplies and environment to maintain asepsis during surgical procedures.
12.0 Demonstrate knowledge of proper handling, packaging, and storage of specimens for laboratory analysis to ensure safety of patients, clients, and staff.
13.0 Properly perform analysis of laboratory specimens.
14.0 Safely and effectively produce diagnostic radiographic and non-radiographic images.
15.0 Safely and effectively handle common laboratory animals used in animal research.
16.0 Understand the approach to providing safe and effective care for birds, reptiles, amphibians, guinea pigs, hamsters, gerbils, and ferrets.

Florida Department of Education
Student Performance Standards

Program Title: **Veterinary Technology**
CIP Number: **1301830100**
Program Length: **73 credit hours**

At the completion of this program, the student will be able to:	
01.0	Participate in facility management utilizing traditional and electronic media and appropriate veterinary medical terminology and abbreviations. The student will be able to:
01.01	Schedule appointments, admit, discharge and triage according to client, patient and facility needs through phone and in-person contact*. • Recognize and respond to veterinary medical emergencies*.
01.02	Create and maintain individual client records, vaccination certificates, and other appropriate forms*: • develop computer skills*. • be able to utilize veterinary practice management software*. • be familiar with veterinary on-line services* (e.g., laboratory submissions, client financing plans, continuing education, discussion groups).
01.03	Perform basic filing of medical records, radiographs, lab reports, etc.*
01.04	Create and maintain all appropriate facility records and logs in compliance with regulatory guidelines (e.g., radiography, surgery, anesthesia, laboratory, controlled substance)*.
01.05	Manage inventory control*.
01.06	Recognize roles of appropriate regulatory agencies*.
01.07	Maintain appropriate disposal protocols for hazardous materials*.
01.08	Establish and maintain appropriate sanitation and infection control protocols for a veterinary facility, including patient and laboratory area*.
01.09	Handle daily client-based financial transactions*.
02.0	Communicate in a professional manner in all formats: written, oral, non-verbal, and electronic. The student will be able to:
02.01	Demonstrate an understanding of interpersonal skills and team dynamics*.
02.02	Utilize appropriate interpersonal and public relations skills*.
02.03	Demonstrate telephone etiquette* (e.g., through role playing, educational resources, etc.).
02.04	Recognize the legality of the veterinary-client-patient relationship*.

	02.05 Develop and provide client education in a clear and accurate manner at a level the client understands (i.e., oral and written form, including educational handouts)*.
	02.06 Apply crisis intervention/grief management skills with clients*.
03.0	Follow and uphold applicable laws and the veterinary technology profession's ethical codes to provide high quality care to patients. The student will be able to:
	03.01 Understand and observe legal boundaries of veterinary health care team members*.
	03.02 Interact professionally with clients and fellow staff members*.
	03.03 Demonstrate a commitment to high quality patient care*.
	03.04 Respect and protect the confidentiality of client and patient information*.
04.0	Safely and effectively administer prescribed drugs to patients. The student will be able to:
	04.01 Read and follow veterinarian's pharmacy orders*.
	04.02 Recognize groups of drugs, their mechanisms, and clinically relevant side effects*.
	04.03 Recognize the safe and effective manner in which vaccines must be administered; recognize and explain common side effects*.
	04.04 Accurately perform appropriate calculations; use weights and measures correctly*.
	04.05 Safely and effectively administer drugs by common parenteral and enteral routes; explain appropriate routes and methods and when used*.
	04.06 Monitor therapeutic responses*.
	04.07 Demonstrate the ability to accurately record medical information*.
	04.08 Demonstrate understanding of controlled substance regulations*.
	04.09 Demonstrate compliance with all federal and state regulatory guidelines for drug purchase, storage, administration, withdrawal, dispensing, disposal, and inventory control (e.g., biologics and therapeutic agents, pesticides, and hazardous wastes)*.
05.0	Accurately dispense and explain prescribed drugs to clients. The student will be able to:
	05.01 Given a drug order, properly prepare medications for dispensing, including performing accurate calculations*.
	05.02 Demonstrate compliance with regulations governing prescription drugs versus over-the-counter drugs*.
	05.03 Demonstrate understanding of regulations governing maintenance of controlled substances log book*.
	05.04 Demonstrate compliance with all federal regulatory and state guidelines for drug purchase, storage, administration, withdrawal, dispensing, disposal, and inventory control (e.g., biologics and therapeutic agents, pesticides, and hazardous wastes)*.

05.05	Relay drug information to clients (e.g., handling, storage, administration, side-effects, drug interactions, safety, reasons for use of drug)*.
06.0	Demonstrate and preform patient assessment techniques in a variety of animal species. The student will be able to:
06.01	Recognize common domestic animal species and breeds*.
06.02	Describe and use common animal identification methods*.

06.03	Demonstrate effective and appropriate restraint techniques for various animal species:
	• *properly restrain dogs and cats for procedures*.*
	• *encage and remove small animals from cages*.*
	• *apply dog muzzle safely*.*
	• *apply Elizabethan collar*.*
	• *use restraint pole and other restraint aids*[GROUP].*
	• *halter, tie, and lead horses*/ponies/donkeys/mules*.*
	• *restrain pocket pets and exotics*
	• *restrain cattle and horses*/ponies/donkeys/mules*.*
	  ○ *apply twitch (horses*/ponies/donkeys/mules*)*[GROUP].*
	  ○ *apply bovine tail restraint*.*
	  ○ *apply bovine halter*.*
	• *restrain sheep and pigs.*
	• *load large animals.*
	• *safely operate cattle chute*[GROUP].*

06.04	Obtain a thorough patient history*.
06.05	*Demonstrate the ability to obtain objective patient data:* • *temperature (dog, cat, horse/*pony/donkey/mule*, cow)*.* • *pulse (dog, cat, horse/*pony/donkey/mule*, cow)*.* • *respiration (dog, cat, horse/*pony/donkey/mule*, cow)*.* • *auscultate heart/lungs* (dog, cat, horse/*pony/donkey/mule*, cow).* • *assess hydration status*
06.06	Properly collect diagnostic specimens for analysis (ex: urine, blood, feces, specimens for cytology)*.
06.07	*Perform venipuncture:* • *cephalic (dog, cat)** • *jugular (dog, cat, horse, ruminant)** • *saphenous (dog, cat)** • *sublingual (dog)* • *ear (pig, rabbit)* • *coccygeal (cow)*

	• *anterior vena cava (pig)*
06.08	*Collect urine sample:* • *catheterize male dog* [GROUP]* • *catheterize female dog* • *catheterize female cat* • *catheterize male cat* • *collect voided urine sample(dog and cat))*.* • *perform cystocentesis (dog and cat)*[GROUP].* • *catheterize large animal*
06.09	Prepare diagnostic specimens for shipment*.
07.0	Understand and demonstrate husbandry, nutrition, therapeutic and dentistry techniques appropriate to various animal species. The student will be able to:
07.01	Grooming: • Demonstrate understanding of therapeutic bathing, basic grooming, and dipping of small animals*. • *trim nails (dog, cat)*.* • trim hooves (ruminant, horse). • *apply equine tail and leg wraps*.* • *express canine anal sacs*.* • *clean and medicate ears (dog, cat)*.* • *clean sheath (horse/pony/donkey/mule).*
07.02	Perform microchip scanning and implantation.
07.03	Environmental conditions: implement sanitation procedures for animal holding and housing areas*.
07.04	Demonstrate understanding of permanent identification*.
07.05	Demonstrate understanding of breeding/reproduction techniques*.
07.06	Demonstrate understanding of care of orphan animals.
07.07	Demonstrate understanding of nursing care of newborns*.
07.08	Understand life stage energy and nutrient requirements of well animals (dog, cat, horse/pony/donkey/mule, cow)*.
07.09	Identify common grains and forages.
07.10	Understand key nutritional factors in disease conditions*. • be familiar with therapeutic foods*.
07.11	Understand current developments in nutritional supplements and additives including benefits and potential toxicities*.

07.12 Understand and identify substances that when ingested result in toxicity: • identify common poisonous plants*. • be familiar with substances (organic and inorganic) that cause toxicity*.
07.13 Develop and communicate hospital nutrition protocols*.
07.14 Administer parenteral medications: • *subcutaneous (dog, cat, ruminant)*.* • *intramuscular (dog, cat, horse)*.* • *intradermal (ruminant, dog).* • *intramammary (mastitis therapy only) (ruminant).* • *intravenous (dog, cat, ruminant, horse)*.*
07.15 Administer enteral medications: • *balling gun (ruminant)** • *dose syringe (ruminant, horse/pony/donkey/mule)** • *gastric intubation (small animal)*[GROUP]* • *hand pilling (dog, cat)** • *gastric lavage (dog)* • *dose syringe (pig)* • *oral speculum and stomach tube (ruminant)* • *nasogastric intubation (small animal, horse/pony/donkey/mule)*
07.16 Administer topical medications (including ophthalmic).*
07.17 Perform ocular diagnostic tests (including tonometry, fluorescein staining and Schirmer tear test).*
07.18 Administer enemas[GROUP].*
07.19 Collect/evaluate skin scrapings.*
07.20 Fluid therapy: • *administer subcutaneous fluids*.* • *place intravenous catheters (cephalic*, saphenous*, jugular).* • *maintain and care for catheters*.* • *determine/maintain fluid infusion rate*.* • *monitor patient hydration status*.* • *develop familiarity with fluid delivery systems*.*
07.21 Apply and remove bandages and splints.*
07.22 Remove casts.
07.23 Develop understanding of wound management and abscess care*.

	07.24 Perform critical care: • maintain chest, tracheostomy, esophagostomy tubes. • *collect and crossmatch blood for transfusion*[GROUP].* • *blood typing.* • *perform blood transfusions (autotransfusions may be considered).*
	07.25 Apply established emergency protocols: • maintain emergency medical supplies/crash cart*. • *perform first aid and cardiopulmonary resuscitation (simulation acceptable)*.* • *use resuscitation bag*.* • *apply emergency splints and bandages*.*
	07.26 Perform routine dental prophylaxis (manual and machine).*
	07.27 Understand client education regarding home care*.
	07.28 Float teeth.
	07.29 Clip teeth.
08.0	Safely and effectively manage and maintain patients in all phases of anesthesia. The student will be able to:
	08.01 Calculate dosages of appropriate anesthetic-related drugs*.
	08.02 Administer anesthetic-related drugs (injection, endotracheal tube, mask).*
	08.03 Place endotracheal tubes in patients.*
	08.04 Utilize clinical signs and appropriate equipment to monitor patient status during anesthetic procedures (e.g., esophageal stethoscope, blood pressure monitor, capnometer, electrocardiogram, pulse oximeter)*.*
	08.05 Evaluate patient and implement pain management protocols as directed*.
	08.06 Recognize and respond appropriately to patients in compromised states*.
	08.07 Perform appropriate resuscitation procedures as needed (e.g., calculate and administer appropriate anesthetic antagonists and emergency drugs as directed)*.
	08.08 Complete controlled substance log* (does not need to be official controlled substance log; mock logs may be utilized).
	08.09 *Record and maintain anesthesia records*.*
09.0	Utilize and maintain anesthetic delivery and monitoring instruments and equipment. The student will be able to:
	09.01 Maintain and operate anesthetic delivery and monitoring equipment: • *pulse oximeter** • *capnometer**

	• *esophageal stethoscope** • *electrocardiograph (e.g., recognize abnormal rhythms/audible sounds, properly apply leads)** • *anesthetic machines, including rebreathing systems, non-rebreathing systems, and masks** • *endotracheal tubes** • *resuscitation bag** • *scavenging systems** • *oxygen sources** • *blood pressure monitoring devices** • *laryngoscopes** • *ventilator* • *defibrillator* • *temperature monitoring device* (e.g. thermometer, etc.)*
10.0	Understand and integrate all aspects of patient management for common surgical procedures in a variety of animal species. The student will be able to:
10.01	Properly identify patients and surgical procedures*.
10.02	Patient assessment • organize medical records/consent forms*. • review pre-operative evaluation*. • evaluate current patient status*. • organize and implement anesthesia*.
10.03	*Palpate the urinary bladder and express it if needed**.
10.04	*Prepare surgical site using appropriate aseptic techniques**.
10.05	*Position patient for common procedures**.
10.06	Provide surgical assistance: • *demonstrate proper operating room conduct and asepsis**. • *assist with care of exposed tissues and organs**. • *properly handle and pass instruments and supplies**. • *operate and maintain suction and cautery machines**. • *understand the principles of operation and maintenance of fiber optic equipment**. • *record and maintain operative/surgical records**. • *perform basic suturing techniques.*
10.07	Coordinate pain management with the anesthesia/surgical team*.
10.08	Provide post-operative care: • pain management* • fluid therapy*

	• adequate nutrition* • wound management* • bandaging* • discharge instructions* • suture removal*
11.0	Understand and provide the appropriate instruments, supplies and environment to maintain asepsis during surgical procedures. The student will be able to:
	11.01 Prepare surgical instruments and supplies.*
	11.02 Prepare gowns, masks, gloves, and drapes.*
	11.03 Operate and maintain autoclaves.*
	11.04 Sterilize instruments and supplies using appropriate methods.*
	11.05 Perform pre-surgical set-up.*
	11.06 Identify and know proper use for instruments.*
	11.07 Identify common suture materials, types, and sizes.*
	11.08 Provide operating room sanitation and care.*
	11.09 Maintain proper operating room conduct and asepsis.*
	11.10 Perform post-surgical clean-up (e.g., equipment, instruments, room, proper disposal of hazardous medical waste).*
12.0	Demonstrate knowledge of proper handling, packaging, and storage of specimens for laboratory analysis to ensure safety of patients, clients, and staff. The student will be able to:
	12.01 Select and maintain laboratory equipment*.
	12.02 Implement quality control measures[GROUP].*
	12.03 Understand how to ensure safety of patients, clients, and staff*.
	12.04 Prepare, label, package, and store specimens for laboratory analysis.*
13.0	Perform analysis of laboratory specimens. The student will be able to:
	13.01 Perform urinalysis: • *determine physical properties (e.g., color, clarity, specific gravity)*.* • *test chemical properties*.* • *examine and identify sediment*.*

13.02	Perform CBC to include: • *hemoglobin** • *packed cell volume** • *total protein** • *white cell count** • *red cell count**
13.03	Perform microscopic exam of blood film: • *prepare film and stain using a variety of techniques*.* • *perform leukocyte differential – normal vs abnormal*.* • *evaluate erythrocyte morphology – normal vs abnormal*.* • *estimate platelet numbers*.* • *calculate absolute values*.* • *correct white blood cell counts for nucleated cells*.*
13.04	Calculate hematologic indices*
13.05	Coagulation tests – perform one of the following*:[GROUP] • *buccal mucosal bleeding time.* • *activated clotting time (ACT).* • *prothrombin time (PT).* • *partial thromboplastin time (PTT).* • *fibrinogen assay.*
13.06	*Perform blood chemistry tests (BUN, glucose, common enzymes)*.*
13.07	*Perform serologic test (ELISA, slide/card agglutinations)*.*
13.08	Identify blood parasites: • Dirofilaria sp/Acanthocheilonema sp (formerly Dipetalonema sp)* • Hemotropic Mycoplasma sp (Hemoplasmas)* (formerly Haemobartonella sp and Eperythrozoon sp) • Anaplasma sp • Babesia sp • Trypanosoma sp • Eperythrozoan sp • Ehrlichia sp
13.09	Perform parasitologic procedures for external parasites and identify: • mites* • lice* • ticks* • fleas* • flies*

13.10 Perform diagnostics procedures for parasites:
- *Antigen kit*, direct*, filter, Knotts* [GROUP]*
- *flotation solution preparation*
- *fecal flotations**
- *fecal sedimentation**
- *direct smears**
- *centrifugation with flotation**
- *adhesive tape retrieval of pinworm ova*
- *perform fecal egg count using McMaster method*

13.11 Identify common parasitic forms:
- nematodes*
- trematodes*
- cestodes*
- protozoa*

13.12 Perform coprologic tests.

13.13 Perform microbiologic procedures/evaluations:
- *collect representative samples*.*
- *culture bacteria and perform sensitivity tests*.*
- *identify common animal pathogens using commercially available media and reagents*[GROUP].*
- *collect milk samples and conduct mastitis testing (e.g., CMT, bacterial culture)*[GROUP].*
- *perform common biochemical tests*[GROUP].*
- *perform staining procedures*.*
- *culture and identify common dermatophytes*.*

13.14 Perform cytologic evaluation.
- *assist in collecting, preparing and evaluating transudate, exudate and cytologic specimens (joint, cerebrospinal, airway, body cavity).*
- *perform fine needle tissue aspirates and impression smear preparation (differentiate benign vs. malignant).*
- *prepare and stain bone marrow specimens.*
- *collect, prepare, and evaluate ear cytology*.*
- *collect, prepare, and evaluate canine vaginal smears*[GROUP].*
- *evaluate semen.*
- *understand timing and types of pregnancy testing.*
- *assist with artificial insemination.*

13.15 Perform necropsy procedures:
- *perform a postmortem examination or dissection on non-preserved animal*[GROUP].*
- *collect samples, store and ship according to laboratory protocols*[GROUP].*
- *explain how to handle rabies suspects and samples safely*.*

	• *handle disposal of dead animals.* • *perform humane euthanasia procedures.*
14.0	Safely and effectively produce diagnostic radiographic and non-radiographic images. The student will be able to:
	14.01 Implement and observe recommended radiation safety measures.*
	14.02 Implement radiographic quality control measures*.
	14.03 Properly utilize radiographic technique charts*.
	14.04 *Position live animals and produce diagnostic radiographic images (dogs*, cats*, horses/ponies/donkeys/mules*, and birds).*
	14.05 Demonstrate an understanding of the modifications of diagnostic imaging techniques as they apply to mice, rats, guinea pigs, lizards, and amphibians*.
	14.06 *Position live animals and utilize dental radiographic equipment to produce diagnostic intra-oral dental radiographic images (dog or cat)*.*
	14.07 Appropriately label, file, and store images.*
	14.08 Demonstrate an understanding of completing a radiographic log for systems, reports, files, and records*.
	14.09 Perform radiographic contrast studies — perform one of the following:[GROUP]* • *GI Series* • *Pneumocystogram* • *Intravenous pyelogram* • *Other*
	14.10 Perform on a sedated canine radiographic techniques utilized in screening for canine hip dysplasia[GROUP].*
	14.11 Demonstrate proper maintenance of radiographic equipment, including recognition of faulty equipment operation*.
	14.12 Use and care of ultrasonography equipment.
	14.13 Use and care of endoscopic equipment.
15.0	Safely and effectively handle common laboratory animals used in animal research. The student will be able to:
	15.01 Recognize and restrain (mouse/rat, rabbit).*
	15.02 Determine sex and understand reproduction (mouse, rat, rabbit).*
	15.03 Perform and/or supervise basic care procedures: • *handling (mouse/rat, rabbit)*.* • *nutritional needs/diet*.* • *provide food, water, and enrichment in a species-appropriate manner (mouse, rat, rabbit)*.*

	• *trim nails.* • *identification*.*
15.04	*Perform methods of injection:* • *subcutaneous (mouse/ rat, rabbit)** • *intramuscular (rabbit)* • *intradermal (rabbit)* • *intraperitoneal (mouse/rat)* [GROUP]* • *intravenous*
15.05	*Collect blood samples* • *Intravenous (mouse/rat [GROUP], rabbit)**
15.06	*Perform oral dosing (mouse/ rat)* [GROUP].*
15.07	Have working knowledge of anesthetic and recovery procedures*.
15.08	Identify and describe clinical signs of common diseases*.
15.09	*Perform necropsy and collect specimens.*
15.10	*Clean and medicate ears (rabbit).*
15.11	*Anesthetize mouse/rat, and rabbit.*
15.12	Understand restraint of non-human primates.
15.13	Demonstrate knowledge of zoonotic diseases and modes of transmission.
16.0	Understand the approach to providing safe and effective care for birds, reptiles, amphibians, guinea pigs, hamsters, gerbils, and ferrets. The student will be able to:
16.01	*Recognize, understand, and perform restraint techniques of birds*, reptiles, amphibians, and ferrets.*
16.02	Understand unique husbandry issues for each species (birds, reptiles, amphibians, guinea pigs, hamsters, gerbils, and ferrets) and provide client education*: • nutritional needs/diet • watering • caging (temperature, humidity, light) • aquarium care • understand reproduction. • basic grooming (beak, wing, and nail clipping). • appropriate transportation methods.
16.03	*Demonstrate the ability to obtain objective data: birds*, reptiles, amphibians, and ferrets.*

16.04 Perform nail trim (bird, exotic, small mammal).*
16.05 Perform injections using appropriate sites: • *subcutaneous* • *intramuscular* • *intradermal* • *intraperitoneal* • *intravenous*
16.06 Perform oral dosing.
16.07 Administer drugs or medicaments using appropriate sites and routes.
16.08 Understand appropriate sites for catheter placement.
16.09 Understand tube feeding in birds.
16.10 Perform laboratory procedures.
16.11 Anesthetize birds and exotic animals.
16.12 Recognize normal and abnormal behavior patterns.
16.13 Explain inadvisability of keeping wildlife as pets.
16.14 Collect blood samples.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

AVMA Student Essential and Recommended Skills
In order to properly prepare students for certification please refer to the Appendix section in the certification manual for the most up to date listings of the American Veterinary Medical Association (AVMA) Student Essential and Recommended Skills List required of students.

Required tasks are denoted by an asterisk (*).

***Italicized* text denotes hands-on (psychomotor) skills; all other text denotes didactic (knowledge-based) skills.** The term "demonstrate" along with a didactic (knowledge-based) skill means that the instructor is free to determine the best method(s) for the student to demonstrate mastery or understanding of that particular skill to the instructor. The term "demonstrate" is not synonymous with "hands-on".

Skills indicated by the designation [GROUP] may be performed by a group of program students. The appropriate size of the group will be determined by the task being performed taking into account humane treatment of the subject animal. Each member of the group must play an active role in the completion of the task.

Students are expected to physically perform skills that are *italicized*.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates (CCC):

Veterinary Assisting (0301830100) - 14 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Environmental Science Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1703010401
Program Type	College Credit
Program Length	64 credit hours
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to conducting environmental surveys, and investigations and evaluations of noise, air and water conditions to determine compliance with public laws and regulations.

Reinforcement of basic skills in English, mathematics, and science appropriate for the job preparatory programs is provided through vocational classroom instruction and applied laboratory procedures or practice. This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the public service industry; planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 64 credit hours.

Standards

After successfully completing this program, the student will be able to perform the following:

01.0 Demonstrate knowledge of the principles of managing water pollution through prevention and remediation
02.0 Demonstrate knowledge of the principles of managing air pollution through prevention and remediation
03.0 Demonstrate awareness of environmental noise sources and their monitoring.
04.0 Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants.
05.0 Sample, analyze and calculate data related to air, water, and soil pollutants.
06.0 Demonstrate an awareness of radiation monitoring and radioactive contamination control.
07.0 Demonstrate and awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems.
08.0 Demonstrate employability skills.

Florida Department of Education
Student Performance Standards

Program Title: **Environmental Science Technology**
CIP Number: **1703010401**
Program Length: **64 credit hours**

At the completion of this program, the student will be able to:	
01.0	Demonstrate knowledge of the principles of managing water pollution through prevention and remediation. The student will be able to:
01.01	Determine chemical and physical properties of surface water and groundwater.
01.02	Describe microbial systems related to water pollution.
01.03	Describe surface water, groundwater systems, hydrologic cycle, potable water and wastewater treatment processes.
01.04	Identify types and sources of surface water and groundwater contamination.
01.05	Describe legal aspects, laws, rules, and consequences of related to surface and groundwater pollution.
01.06	Collect water samples for field and laboratory analysis.
01.07	Identify the water quality standards for effluent from domestic and various industrial wastewater facilities.
01.08	Describe ambient water quality criteria.
01.09	Demonstrate the technology and methods applied to non-point source pollution control (stormwater and agriculture runoff).
02.0	Demonstrate knowledge of the principles of managing air pollution through prevention and remediation. The student will be able to:
02.01	Identify natural and manmade pollutants; their sources, effects, and control techniques.
02.02	Define and discuss atmosphere, meteorology, and topography.
02.03	Collect and analyze ambient and process air samples.
02.04	Describe legal aspects, laws, rules, and consequences related to air pollution.
02.05	Describe legal aspects and consequences of air pollution.
02.06	List the regulated parameters of emission for selected industrial sources.
02.07	List the types of air pollution control devices used to control emissions of sulfur oxides, nitrogen oxides, particulates, and volatile organic contaminants.

	02.08 Measure air pollutants from a specific source.
	02.09 Describe ambient air quality criteria.
	02.10 Record, interpret and report laboratory analyses.
03.0	Demonstrate awareness of environmental noise sources and their monitoring. The student will be able to:
	03.01 Define and discuss the physical properties of sound.
	03.02 Discuss the threshold of hearing, tolerance, and hearing loss.
	03.03 Discuss environmental noise, its effect on humans, and solutions to noise pollution.
	03.04 Describe legal aspects, laws, rules, and consequences related to noise pollution.
	03.05 List the sources of noise.
	03.06 Identify the regulatory agencies that monitor and control~~s~~ noise sources.
	03.07 List the control devices for different noise sources.
04.0	Operate and calibrate laboratory and field instruments used in quantitative and qualitative analysis of pollutants. The student will be able to:
	04.01 Demonstrate knowledge of basic laboratory operation.
	04.02 Operate and calibrate selected laboratory instruments.
	04.03 Operate and calibrate selected field instruments and equipment.
05.0	Sample, analyze and calculate data related to air, water and soil pollutants. The student will be able to:
	05.01 Gather and analyze selected samples.
	05.02 Manipulate data and reach confident conclusions.
	05.03 Write formal technical reports.
	05.04 Identify and perform the correct analysis for selected air pollutants listed with state and federal regulations.
	05.05 Identify and perform the correct analysis for selected parameters listed with state and federal regulations for wastewater effluent, surface water and groundwater.
06.0	Demonstrate an awareness of radiation monitoring and radioactive contamination control. The student will be able to:
	06.01 Discuss atomic structure, radiation, and radioactive decay.

	06.02 Discuss types and sources of radiation.
	06.03 Demonstrate knowledge of radiation exposure and dosimetry measurements.
	06.04 Discuss the immediate and long range effects of radiation on animals and plants.
	06.05 Discuss nuclear power plant design, nuclear power hazards, and safety features.
	06.06 Discuss nuclear fuel reprocessing and storage and waste disposal.
	06.07 Discuss legal aspects, laws, rules, and consequences related to radioactive pollution.
07.0	Demonstrate an awareness of solid waste, the problems engendered by solid waste accumulation and disposal and solutions to those problems. The student will be able to:
	07.01 Discuss the composition, sources, and quantity of solid waste.
	07.02 Discuss methods of solid waste disposal.
	07.03 Discuss various solutions to solid waste accumulations and disposal.
	07.04 Discuss legal aspects, laws, rules, and consequences related to solid waste pollution.
	07.05 Identify the solid wastes from domestic households, municipalities, and industry.
	07.06 Identify a sanitary landfill.
	07.07 Discuss the construction features of a safe landfill.
	07.08 Discuss the possibilities of contaminates (leachates) seeping into the groundwater.
	07.09 Discuss the purpose for installing monitoring wells located around a sanitary landfill.
	07.10 Discuss the kinds of wastes that are permitted by state and federal regulation to be disposed at a landfill site.
08.0	Demonstrate employability skills. The student will be able to:
	08.01 Conduct a job search.
	08.02 Secure information about a job.
	08.03 Create a resume package, including a cover letter.
	08.04 Identify documents that may be required when applying for a job.
	08.05 Complete a job application.

08.06 Demonstrate competence in job interview techniques.
08.07 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
08.08 Identify acceptable work habits.
08.09 Demonstrate knowledge of how to make job changes appropriately.
08.10 Demonstrate acceptable employee health habits and safety skills.
08.11 Demonstrate time management skills.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication.
- Humanities.
- Mathematics.
- Natural Sciences.
- Social Sciences.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Certificate Programs

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.). This AS degree program includes the following College Credit Certificates (CCC):

Environmental Science Technician (0703010407) – 30 credit hours
Hazardous Materials Specialist (0703010403) – 14 credit hours

Water Quality Technician (0703010404) – 12 credit hours

Standards for the above certificate programs are contained in separate curriculum frameworks.

Florida Department of Education
Curriculum Framework

Program Title: **Veterinary Assisting**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Career Certificate Program		
Program Number	A010512	
CIP Number	0101830100	
Grade Level	30, 31	
Program Length	750 hours	
Teacher Certification	Refer to the **Program Structure** section.	
CTSO	N/A	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 9	Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the veterinary assisting industry within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to broad, transferable skills and stresses understanding and demonstration of the following elements of the veterinary assisting industry: planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues. The program also provides supplemental training for persons previously or currently employed as veterinary assistants.

Program Structure

This program is a planned sequence of instruction consisting three postsecondary adult courses that comprise three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	ATE0006	Veterinary Assistants and Laboratory Animal Caretakers 1	AGRICULTUR 1 @2 AGRI @2 AG SUPPLI @7 G VET ASSIST 7G	450 hours
B	ATE0070	Veterinary Assistants and Laboratory Animal Caretakers 2		150 hours
C	ATE0072	Veterinary Assistant		150 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Veterinary Assistants and Laboratory Animal Caretakers 1

01.0 Describe veterinary science and the role of animals in society.
02.0 Describe the socioeconomic role of veterinary sciences on the companion animal livestock industries.
03.0 Discuss the human-animal bond and its effects on human health.
04.0 Demonstrate the proper use of veterinary science terminology.
05.0 Identify careers in the animal industry.
06.0 Practice safety.
07.0 Recognize normal and abnormal animal behaviors.
08.0 Restrain and control companion and livestock animals.
09.0 Identify common breeds of companion animals and husbandry practices.
10.0 Demonstrate human-relations, communications, and leadership through FFA activities.
11.0 Demonstrate basic first aid for companion and livestock animals.
12.0 Demonstrate the use of tools, equipment, and instruments in the veterinary science and companion animal industry.
13.0 Demonstrate proper techniques in taking vital signs.
14.0 Investigate the common breeds and husbandry practices for several species of animals.
15.0 Identify parts and functions of various systems of common companion and livestock animals.
16.0 Explain the various methods of animal identification.
17.0 Demonstrate knowledge of animal control and animal welfare organizations.
18.0 Describe the problems, causes, and solutions of animal overpopulation.
19.0 Locate and interpret animal-related laws, in state statutes, or local ordinances.
20.0 Identify the different digestive systems of animals and the nutritional requirements of selected species.
21.0 Explain the reproductive system and breeding of common companion and livestock animals.
22.0 Investigate the common husbandry practices and daily care of companion animals and exotic animals and fish.
23.0 Demonstrate knowledge of preventive medicine and disease control.
24.0 Demonstrate human-relations, communications, leadership, and employability skills.

Veterinary Assistants and Laboratory Animal Caretakers 2

25.0 Differentiate between animal welfare and animal rights.
26.0 Explain the role of animals in research.
27.0 Maintain and analyze records.
28.0 Explain proper sanitation for animal facilities.
29.0 Explain diagnostic testing and use of equipment.
30.0 Describe internal and external parasites and control methods.

Veterinary Assistant

31.0 Groom selected companion and livestock animals.

32.0 Describe exotic animals and the effects of captivity on them.
33.0 Assess techniques used in surgical assisting and surgical preparation.
34.0 Explain principles of pharmacology.
35.0 Explain proper methods of syringe and hypodermic needle use.

Florida Department of Education
Student Performance Standards

Program Title: **Veterinary Assisting**
Career Certificate Number: **A010512**

Benchmarks that appear in italics within the framework are skills or competencies that have been taken directly from the FVMA Skills Competency Validation list. The most up to date validation list can be found on the FVMA website.

Course Number: ATE0006 **Occupational Completion Point: A** **Veterinary Assistants and Laboratory Animal Caretakers 1 – 450 Hours**	
01.0	Describe veterinary science and the role of animals in society. The student will be able to:
01.01	Define veterinary science.
01.02	Identify key components in the domestication of animals.
01.03	Choose current issues facing the animal industry today and describe the effect of each on society.
02.0	Describe the socioeconomic role of veterinary sciences on the companion animal and livestock industries. The student will be able to:
02.01	Summarize the history of the veterinary science, companion animal and livestock industry.
02.02	Discuss the role of companion animals on the veterinary science industry.
02.03	Discuss the role of livestock animals on the veterinary science industry.
03.0	Discuss the human-animal bond and its effects on human health. The student will be able to:
03.01	*Describe the human-animal bond and its influence on veterinary care.*
03.02	*Compare and contrast different types of human-animal bonds for companion animals, working animals and livestock.*
03.03	Discuss the positive health effects on people resulting from their interaction with animals.
03.04	Discuss programs that use human-animal interaction as a therapy tool.
03.05	Describe the characteristics of animals used in the animal-facilitated therapy programs.
03.06	Describe national and local programs that use animal-facilitated therapy.
03.07	Discuss stages of grief of animal loss.

04.0	Demonstrate the proper use of veterinary science terminology. The student will be able to:
	04.01 Define common veterinary and medical terms, including directional terminology.
	04.02 Compile a list of prefixes, suffixes, and root words for veterinary medical terminology.
	04.03 Categorize gender and species-related terminology.
	04.04 List common medical and veterinary abbreviations
05.0	Identify careers in the animal industry. The student will be able to:
	05.01 Differentiate between entry and advanced level animal-industry careers.
	05.02 Identify professional organizations and trade journals in the animal industry.
	05.03 Investigate career opportunities in the veterinary science, companion animal, and large animal industry; also identify degree or credential needed to prepare for those careers.
	05.04 Using national or state credentialing agencies as a reference, distinguish between a Veterinary Assistant, Credentialed Veterinary Assistant, Veterinary Technician, Credentialed Veterinary Technician, and Veterinary Technologist.
	05.05 Investigate requirements necessary to earn and maintain Veterinary Assisting Certification.
06.0	Practice safety. The student will be able to:
	06.01 Recognize and avoid potential safety hazards (physical, chemical, biological, and zoonotic).
	06.02 Utilize proper safety precautions and procedures when working in the hospital and/or animal handling areas.
	06.03 Demonstrate knowledge on how to use personal protective equipment- PPE (wears gloves, goggles, face mask, ear plugs, apron, gown, cap, and shoe covers when needed).
	06.04 Locate and demonstrate use of an eye wash solution or station.
	06.05 Locate first aid kit and fire extinguisher.
	06.06 Explain OSHA (Occupational Safety and Health Act) and its regulations pertaining to a veterinary practice, including sanitation, safety of employees and the employee's right to know of potential work place hazards through SDS (Safety Data Sheets) and the written hazard communication plan.
	06.07 Demonstrate knowledge of OSHA regulations regarding the handling, placement and disposition of sharps and bio-hazardous material.
	06.08 Handle and uses disposable "sharps" containers in a safe manner.
	06.09 Explain correct labeling of secondary containers with appropriate safety information.

	06.10 Practice safety precautions around animals, list the most common causes of animal related accidents.
07.0	Recognize normal and abnormal animal behaviors. The student will be able to:
	07.01 Identify instinctive and learned behaviors.
	07.02 Differentiate between normal and abnormal behavioral characteristics of animals.
	07.03 Recognize signs of aggressive animal behaviors.
	07.04 Describe behavioral changes due to aging.
08.0	Restrain and control companion and livestock animals. The student will be able to:
	08.01 Discuss the proper method for placing large animals in a stall, paddock, and trailer.
	08.02 Safely handle and restrain dogs, cats, and other animals for exams, procedures, and treatment to prevent undue stress or harm to either animals or humans. • *Lifting positioning and restraining animals.* • *Position an animal in sternal dorsal and lateral recumbency.* • *restraint of a small dog on an exam table.* • *restraint of a cat on an exam table.* • *restraint of a large dog on and exam table, lift table, and on the floor.* • *place a lead on a dog slip lead and standard leash.*
	08.03 Demonstrate verbal and physical restraint of animals.
	08.04 Demonstrate how to match appropriate level of restraint for an individual animal's level of resistance and situation.
	08.05 Explain appropriate methods for placing and removing animals from kennels.
	08.06 Identify venipuncture sites and accepted restraint for companion and livestock animals; [ex. cephalic vein (cat & dog), jugular vein (cat & dog), femoral vein (cat), saphenous vein (dog)jugular (horse & goat), tail (cow & pig)].
	08.07 Demonstrate use of muzzle on a dog using commercial, leash, and gauze muzzles of appropriate size.
	08.08 Demonstrate currently accepted standards for restraint of the cat including towels, scruff technique, commercial muzzles, cat bags, leather gloves, and the squeeze cage.
	08.09 Explain methods of restraint for exotic and avian animals.
	08.10 Identify the appropriate restraining methods for the following: • Halter, tie and lead horses and cattle. • Application of twitch, nose tongs. • Restrain sheep, goats, and swine. • Restrain poultry.

	08.11 Discuss chemical restraints of animals.
09.0	Identify common breeds of companion animals and husbandry practices. The student will be able to:
	09.01 Identify canine breeds and list breed characteristics and husbandry practices.
	09.02 Identify feline breeds and list breed characteristics and husbandry practices.
10.0	Demonstrate human-relations, communications, and leadership through FFA activities. The student will be able to:
	10.01 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.
	10.02 Delineate the major events in the history of the FFA.
	10.03 Develop, implement, and maintain work-based learning through a Supervised Agricultural Experience (SAE) program.
11.0	Demonstrate basic first aid for companion and livestock animals. The student will be able to:
	11.01 Recognize emergency health (physical and behavioral) status.
	11.02 Describe procedures to restrain and move injured animals.
	11.03 Demonstrate hemorrhage control.
	11.04 Dress wounds and punctures.
	11.05 Demonstrate the correct emergency procedures for shock, burns, heatstroke, and fractures.
	11.06 Demonstrate companion animal CPR.
	11.07 Recognize allergic reactions and toxicity.
12.0	Demonstrate the use of tools, equipment, and instruments in the veterinary science and companion animal industry. The student will be able to:
	12.01 Identify, demonstrate and maintain the proper tools, equipment, and instruments for common veterinary procedures.
	12.02 Demonstrate the ability to use an equipment or instrument manual.
13.0	Demonstrate proper techniques in taking vital signs. The student will be able to:
	13.01 Obtain and record the TPR (temperature, pulse, and respiratory rate), MM (mucus membrane color), CRT (capillary refill time) with minimal discomfort to pet.
	13.02 Demonstrate how to use, clean, and store thermometers.
	13.03 Identify normal and abnormal range for each parameter (TPR, MM, and CRT).

14.0	Investigate the common breeds and husbandry practices for several species of animals. The student will be able to:
	14.01 Identify bovine breeds and their characteristics, and husbandry practices.
	14.02 Identify ovine breeds and their characteristics and husbandry practices.
	14.03 Identify caprine breeds and their characteristics and husbandry practices.
	14.04 Identify porcine breeds and their characteristics and husbandry practices.
	14.05 Identify equine breeds and their characteristics and husbandry practices.
	14.06 Identify poultry breeds and their characteristics and husbandry practices.
15.0	Identify parts and functions of various systems of common companion and livestock animals. The student will be able to:
	15.01 Identify internal and external anatomy of common companion and livestock animals.
	15.02 Identify parts and functions of the following systems of animals using correct terminology:
	• *Identify the general function of the respiratory system and the major organs.*
	• *Identify the general function of the skeletal system and the major bones of the axial and appendicular skeleton.*
	• *Identify the general function of the muscular system and major groups of muscles.*
	• *Identify the general function of the digestive system and the major organs.*
	• *Identify the general function of the cardiovascular system and the major organs.*
	• *Identify the general function of the respiratory system and the major organs.*
	• *Identify the general function of the endocrine and the major organs.*
	• *Identify the general function of the urinary system and the major organs.*
	• *Identify the general function of the reproductive system and both male and female organs.*
	• *Identify the general function of the nervous system and the major organs.*
	• *Identify the general function of the integumentary system and the major organs.*
	• *Explain the differences in the teeth and eating habits for omnivores, carnivores, and herbivores.*
16.0	Explain the various methods of animal identification. The student will be able to:

	16.01 Explain types of identification tags and their use.
	16.02 Explain the use of microchips for animal identification.
	16.03 Explain types of tattoos for animals and the use in both companion and production animals.
	16.04 Explain the types of ear tags and their use in production animals.
	16.05 Explain types of ear notching and use for identification.
17.0	Demonstrate knowledge of animal control and animal welfare organizations. The student will be able to:
	17.01 Differentiate between animal control agencies and animal welfare organizations.
	17.02 Describe the responsibilities and goals of animal control agencies and animal welfare organizations
	17.03 Identify and locate local animal control agencies and animal welfare organizations.
18.0	Describe the problems, causes, and solutions of animal overpopulation. The student will be able to:
	18.01 Explain the cause and effect of overpopulation in animals.
	18.02 Define euthanasia and describe its role in animal overpopulation.
	18.03 Explain the pet owners' and societies' responsibilities concerning animal overpopulation.
	18.04 Discuss the medical benefits of spaying and neutering.
19.0	Locate and interpret animal-related laws, in state statutes, or local ordinances. The student will be able to:
	19.01 Describe local animal control laws.
	19.02 Describe permitting requirements for exotic and wildlife animals.
	19.03 Demonstrate knowledge of local and state animal regulations.
	19.04 Determine the legal limitations of duties of an employee in the animal services industry.
	19.05 Identify when an Animal Health Certificate is required.
	19.06 Explain the laws governing the sale of animals and the disposal of animals.
	19.07 List the legal options for euthanasia.
	19.08 List the legal options for disposal of the pet's body.

20.0	Identify the different digestive systems of animals and the nutritional requirements of selected species. The student will be able to:
	20.01 Differentiate between ruminants and non-ruminants (monogastric and hind gut fermentors).
	20.02 Differentiate the teeth and eating habits of omnivores, carnivores, and herbivores.
	20.03 Describe the basic nutritional requirements of selected species.
	20.04 Analyze different feed labels and identify feed ingredients.
	20.05 Explain the appropriate storage for dry and canned dog or cat food.
	20.06 Explain nutritional needs based on life stage and size of animal and choose appropriate food and amount for specific animals for general care.
	20.07 Explain potential problems with feeding therapeutic foods incorrectly or to the wrong patient.
21.0	Explain the reproductive system and breeding of common companion and livestock animals. The student will be able to:
	21.01 Explain the male and female reproductive systems of common companion and livestock animals.
	21.02 Determine sex of animals.
	21.03 Determine appropriate age or weight for breeding.
	21.04 Identify gestation length.
	21.05 Describe estrous cycle.
	21.06 Describe breeding techniques (e.g., Natural, artificial insemination, etc.).
	21.07 Identify selection criteria of males and females for reproduction.
	21.08 Describe care of breeding stock.
22.0	Investigate the common husbandry practices and daily care of companion animals and exotic animals and fish. The student will be able to:
	22.01 Describe breeds, characteristics and husbandry and care of guinea pigs.
	22.02 Describe breeds, characteristics and husbandry and care of chinchillas and degus.
	22.03 Describe breeds, characteristics and husbandry and care of ferrets.
	22.04 Describe breeds, characteristics and husbandry and care of amphibians.
	22.05 Describe breeds, characteristics and husbandry and care of reptiles.

	22.06 Describe breeds, characteristics and husbandry and care of birds.
	22.07 Describe breeds, characteristics and husbandry and care of fish.
	22.08 Describe breeds, characteristics and husbandry and care of avian species.
	22.09 Describe breeds, characteristics and husbandry and care of reptile species.
	22.10 Describe breeds, characteristics and husbandry and care of rabbits.
	22.11 Describe breeds, characteristics and husbandry and care of rodents.
23.0	Demonstrate knowledge of preventive medicine and disease control. The students will be able to:
	23.01 Describe the importance of preventive medicine for animal health.
	23.02 Differentiate between healthy and sick animals.
	23.03 Describe common infectious and noninfectious diseases of animals to include bacterial, viral, fungal, prion and zoonotic.
	23.04 Describe vaccinations available for disease prevention and vaccination procedures.
	23.05 Describe isolation or quarantine procedures for new or sick animals. • Describe methods of preventive medicine and quarantine for disease control in a kennel, cattery, paddock, rabbitry, and zoo.
	23.06 Discuss the terms immunology and active and passive immunity as it applies to disease and vaccination.
	23.07 Describe concepts for periodic health check-up.
	23.08 *List and discuss common zoonotic diseases.*
24.0	Demonstrate human-relations, communications, leadership, and employability skills. The student will be able to:
	24.01 Follow oral and written directions with understanding; ask questions that clarify directions, as needed.
	24.02 Communicate effectively in verbal, written, and nonverbal modes; demonstrate effective telephone skills.
	24.03 Conduct small, informal, formal, and group meetings using basic parliamentary procedure.
	24.04 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.
	24.05 Demonstrate acceptable employee hygiene habits.
	24.06 Complete pertinent forms for employment, such as a resume, a job application, a W-4 form.
	24.07 Demonstrate job interview techniques.

24.08	*Student avoids misrepresentation, slander, violating client confidentiality, substandard patient care, substance abuse, or animal abuse/neglect.*
24.09	*Explain the veterinarian-client-patient relationships.*
24.10	*Explain the importance of keeping their credentials current with continuing education credits.*
24.11	*Conforms to safety and professional dress code by dressing in well- fitting scrubs or uniforms, closed- toed shoes, avoids excessive or loose jewelry, or excessive and visible body-piercings or tattoos, avoids long or fake nails, and keeps hair short or tied back.*
24.12	*Actively observe his/her working environment and animals, promptly reporting observations and concerns to the veterinary technician or veterinarian as needed.*
24.13	*Demonstrate initiative to complete tasks.*
24.14	*Accurately follow both oral and written instructions.*
24.15	*Discuss ways to resolve complaints or conflicts with either pet owners/clients or co-workers in a professional manner.*

Course Number: ATE0070 **Occupational Completion Point: B** **Veterinary Assistants and Laboratory Animal Caretakers 2 – 150 Hours**	
25.0	Differentiate between animal welfare and animal rights. The student will be able to:
25.01	Define animal welfare and animal rights.
25.02	Compare and contrast between animal welfare and animal rights.
25.03	Identify animal welfare and animal rights advocate groups.
25.04	Debate current events concerning animal welfare and animal rights.
25.05	Describe animal cruelty and the consequences of cruel treatment of animals.
26.0	Explain the role of animals in research. The student will be able to:
26.01	Describe the history of the role of animals in research.
26.02	Discuss medical advances made possible through the use of animals in research.
26.03	Define USDA and explain its roles in using animals for research.
26.04	Describe the role of the Institutional Animal Care and Use Committee (IACUC) with regard to animal research facilities.
26.05	Explain the controversy over using animals in research.

	26.06 Identify organizations that are in favor of and those that are against the use of animals in research.
	26.07 Develop a personal position on the use of animals in research and support that position.
	26.08 Explain how biotechnology has affected animal research.
	26.09 Debate the use of cloning for research purposes.
27.0	Maintain and analyze records. The student will be able to:
	27.01 Discuss the legal requirements of maintaining animal health records and maintain and analyze animal health records.
	27.02 Maintain and analyze basic business records (inventory, depreciation, receipts, expenses), using computer applications.
	27.03 Explain the process of scheduling appointments.
	27.04 Demonstrate admissions and discharges for boarders or non-medical cases.
	27.05 Demonstrate filing and retrieving of records from both numerical and alphabetical filing systems.
	27.06 Demonstrate computer and keyboarding skills.
	27.07 Demonstrate data collection from organized records.
	27.08 Discuss legal requirements of veterinary medical records to include: (1) establish veterinarian-client-patient relationship, (2) contain owner and patient information, (3) contain patient history, and (4) contain contemporaneously written medical procedures.
	27.09 Describe the duties of an office or hospital staff member as outlined by NAVTA which includes: • *Greet pet owner/client, identifies his/herself by name and as veterinary assistant in a professional manner.* • *Obtain or confirm pet owner/client and pet information including pet owner/client's name, address, and phone numbers; pet's name, species, breed, color, sex and neutered/not neutered, and age or birth date.* • *Discuss process for recording new information and/or confirms existing information on medical record using appropriate medical terminology and concise notations. Include current date and reason for appointment.* • *Obtain and record the pet's vital signs (TPR, MM, & CRT) and weight with minimal restraint to the pet.* • *Leave the exam room courteously indicating the veterinarian will be right in.*
	27.10 Explain the importance of client/patient confidentiality.
28.0	Explain proper sanitation for animal facilities. The students will be able to:
	28.01 Demonstrate proper sanitation techniques for an examination room, hospital facilities, surgical suites, kennel, cattery, paddock, rabbit hutch, and zoo.
	• *Keep assigned work areas clean and organized.*
	• *Explain sanitary procedures including physical cleaning, disinfecting, and sterilizing.*

	• *Demonstrate proper cleaning protocols for kennels, runs, and enclosures including cleaning and disinfecting all sides of the kennel (floor, ceiling, walls, & door) and all items in the kennel (bowls, blankets, toys, etc.).*
	• *List precautions to take when mixing or using multiple cleaning and disinfecting agents i.e., NEVER mix bleach with ammonia containing cleaners or disinfectants.*
	• *Change bedding materials in a timely and efficient manner.*
	• *Demonstrate of the proper disposal of bedding and waste materials.*
	• *Notify supervisor of needed repair or maintenance on cages, kennels, or stalls.*
29.0	Explain diagnostic testing and use of equipment. The student will be able to:
	29.01 Explain the proper placement of a slide in the microscope and focus on 100X and 400X magnification.
	29.02 Explain appropriate materials for cleaning the microscope.
	29.03 Demonstrate the centrifugation of a sample.
	29.04 Explain the purpose of the blood analyzer machine.
	29.05 Explain a urinalysis including:
	• *List methods for urine collection commonly used in the veterinary practice.*
	• *Collect a free-caught urine sample using proper techniques for dogs.*
	• *Identify time and storage parameters for urine samples.*
	• *List precautions and safety factors in handling urine samples including personal protection equipment.*
	29.06 Explain fecal test including:
	• *Explain methods of collecting fecal samples.*
	• *Identify time and storage parameters for fecal samples.*
	• *Identify appropriate volume of feces for each method of testing.*
	• *Demonstrate the correct technique for handling and preparing the fecal samples for analysis by flotation, sedimentation, and direct smear.*
	• *Explain appropriate method of placing sample on microscope slide or cover slip.*
	• *List precautions and safety factors in handling fecal samples including personal protection equipment.*

29.07	Examine radiology, electrocardiogram and ultrasound imaging techniques and safety.
	• *Discuss restrictions from radiation exposure for pregnant women and minors.*
	• *Explain what a dosimeter badge does and who wears it and when.*
	• *Describe the area of exposure in the radiology room including direct beam and scatter radiation.*
	• *Explain the correct use of personal protection equipment including lead-shielded gowns, lead gloves, lead thyroid shield, lead glasses, and other lead protective wear.*
	• *Explain methods of restraint for positioning for radiographs including chemical restraint.*
	• *Explain the proper handling of radiographic film including safe light use.*
	• *Demonstrate the appropriate labeling of a radiograph including date, patient. name, view or side of patient, machine settings, and film developing.*
	• *Maintain radiograph log and filing of films.*
	• *Explain how digital radiography differs from film.*
29.08	Describe the process for handling a suspected rabies patient, and the process for other deceased animals.
	• *List the common species which may transmit rabies to humans.*
	• *Explain the methods of transmission of rabies to animals and humans.*
	• *List the symptoms associated with rabies.*
	• *Explain the proper safety measures to follow when handling an animal suspected of having rabies.*
	• *Explain the procedure for euthanasia suitable as an explanation for a pet owner.*
	• *Discuss the grief process that an owner may experience on the loss of the pet.*
	• *Discuss the importance of presenting the body of the pet in a respectful and empathetic way.*
30.0	Describe internal and external parasites and control methods. The student will be able to:
30.01	*Set up fecal flotations or centrifuged fecal samples.*
30.02	*Identify ectoparasites fleas, ticks, lice, and mites and explain the life cycle and treatment and prevention methods.*
30.03	*Identify ova of endoparasites roundworms, hookworms, whipworms, strongyles and explain the life cycle and treatment and prevention methods.*

	30.04 Identify adult endoparasites roundworms, hookworms, whipworms, strongyles and heartworms.
	30.05 Identify giardia and coccidia in fecal samples.
	30.06 Identify tapeworm segments in fecal sample or on pet.

Course Number: ATE0072 Occupational Completion Point: C Veterinary Assistant -- 150 Hours	
31.0	Groom selected companion and livestock animals. The student will be able to:
	31.01 Discuss using a variety of brushes, combs, flea combs, mat splitters, undercoat rakes, etc. to groom animal hair/fur as needed for both cosmetic and therapeutic reasons.
	31.02 Explain using clippers to cut animal hair/fur as needed for both cosmetic and therapeutic reasons.
	31.03 Explain the necessity of following written and oral instructions and all label directions regarding shampoos for bathing and therapeutic or flea rinses (dips).
	31.04 List precautions in bathing and dipping including avoiding soap or chemicals in the eyes, lathering the entire body, timing the shampoo application according to directions, and towel or blow drying.
	31.05 Identify the area of blood and nerve supply of the nail in the dog and cat and common pets such as rabbits and ferrets.
	31.06 Identify appropriate instrument or nail trimmer for small and large dogs and cats.
	31.07 Demonstrate comfortable handling of paw or limb during nail trim for dog and cat.
	31.08 Explain methods for hemostasis if nail is accidentally trimmed too short.
	31.09 Notify supervisor of abnormalities including in-grown nails and abnormal growth or shape.
	31.10 Describe the steps in expressing anal sacs using the external method.
	31.11 Discuss proper hoof care and hoof trimming needs.
32.0	Describe exotic animals and the effects of captivity on them. The student will be able to:
	32.01 Define exotic animal, zoo animal, invasive and native animals.
	32.02 Identify exotic animals native and invasive to Florida.
	32.03 Explain the effects of urban sprawl on the wildlife population.
	32.04 Describe the roles of the Florida Fish and Wildlife Conservation Commission in wildlife management.

	32.05 Explain state, national, and international laws affecting the purchase and transport of exotic animals.
33.0	Assess techniques used in surgical assisting and surgical preparation. The student will be able to:
	33.01 Prepare and sterilize surgical equipment and supplies. • *Explain standard procedure for cleaning and lubricating all stainless steel instruments.* • *Explain appropriate use of ultrasonic instrument cleaning and proper solutions.* • *Explain cold sterilization trays and appropriate solutions.* • *Demonstrate assembly and wrapping of surgical packs for sterilization.* • *Demonstrate folding and wrapping a surgical gown for sterilization.* • *Explain proper procedure for sterilizations methods including the autoclave and gas sterilization (ethylene oxide) including safety precautions with each.*
	33.02 Describe components of surgical assisting. • *Explain aseptic protocol for maintaining sterility of the surgical field.* • *Demonstrate what can and cannot be touched when assisting in a surgical environment.* • *Demonstrate how suture material might be removed from its outer packaging and passed to the surgeon while maintaining sterility.*
	33.03 Summarize procedures necessary of patient preparation. • *Explain reason for pre-surgical fasting and appropriate time interval.* • *List methods to identify animal for surgery and confirm identity.* • *Demonstrate dorsal and sternal recumbancy positioning and securing animal in each on the surgery table under anesthesia as instructed by the veterinary technician or veterinarian.* • *Demonstrate clipping or shaving surgical field as instructed by the veterinary technician or veterinarian.* • *Demonstrate cleaning and disinfecting the surgical field using currently accepted standards for aseptic technique and surgical scrub.*
	33.04 Identify proper post-surgical care techniques. • *List parameters to monitor during recovery and signs of distress in the recovery period.* • *Explain the swallow reflex and the appropriate time and method for endotracheal tube removal.* • *Explain appropriate transfer of animal from surgery to recovery kennel, positioning in kennel, and precautions in kennel.* • *Confirm "No food or water" or similar instructions on recovery kennel.*
34.0	Explain principles of pharmacology. The student will be able to:
	34.01 Identify forms of medication including tablet, capsule, liquid, powder, granules, topical creams, liquids, and gels.
	34.02 Explain the application of topical flea medication.
	34.03 Demonstrate the reconstitution of vaccine using appropriate diluents and amounts of diluents.
	34.04 Demonstrate administration oral medications on companion and livestock animals.

	34.05 List the components that must be present on a prescription label.
	34.06 Observe and understand controlled substances logs and security.
	34.07 Inventory pharmacy supplies and notify supervisor of low supplies.
	34.08 Identify expiration date on labels and notify supervisor of expired drugs.
	34.09 Maintain clean shelves and storage areas for pharmaceuticals.
	34.10 Describe the process for administering medications by injection, oral, nasal, and topical.
	34.11 Describe the procedure for safe disposal of medications.
	34.12 Determine methods to observe animals for medicine side effects or allergies.
35.0	Explain proper methods of syringe and hypodermic needle use. The student will be able to:
	35.01 Identify and give the correct alignment from smallest to largest of hypodermic needles including but not limited to: 12 g, 18 g, 20 g, 22 g and 25 g.
	35.02 Identify and align from smallest to largest commonly used syringes including but not limited to: 3cc, 6cc, 12cc, 20cc, 35cc, 60cc and 1cc tuberculin or insulin syringe.
	35.03 Demonstrate the ability to read the precise volume of medication in a syringe and to fill a syringe with medication to a specified volume when requested.
	35.04 Describe appropriate SQ, IM, and IV injection sites.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Benchmarks that appear in italics within the framework are skills or competencies that have been taken directly from the FVMA Skills Competency Validation list. The most up to date validation list can be found on the FVMA website.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Reading and Language Arts). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02, Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01, F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College System Institution must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91, F.S.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Program Title: **Nursery Management**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Career Certificate Program		
Program Number	A010616	
CIP Number	0101060602	
Grade Level	30, 31	
Program Length	900 hours	
Teacher Certification	Refer to **Program Structure** table.	
CTSO	N/A	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 9	Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the horticulture and landscape industries within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	ORH0862	Nursery Workers	AGRICULTUR 1 @2 HORTICULT #7	300 hours
B	ORH0863	Nursery and Greenhouse Managers 1	AGRICULTUR 1 @2 AGRI @2 HORTICULT #7	450 hours
C	ORH0864	Nursery and Greenhouse Managers 2		150 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Nursery Workers

01.0 Describe the horticulture industry.
02.0 Identify safety procedures in the workplace.
03.0 Identify and classify plants.
04.0 Demonstrate plant propagation techniques.
05.0 Identify growing media and apply fertilizers.
06.0 Apply irrigation skills for plants and turf.
07.0 Demonstrate integrated pest management approaches.
08.0 Describe the principles and requirements for plant growth.
09.0 Apply best management practices in horticulture industry.
10.0 Identify principles of landscape design.
11.0 Apply safety procedures in the workplace.
12.0 Classify plants based on scientific principles.
13.0 Demonstrate proper use of growing media and fertilizers.
14.0 Demonstrate Integrated Pest Management approaches.
15.0 Identify the principles and requirements of plant growth.
16.0 Apply best management practices in landscape design.
17.0 Apply principles of landscape design and maintenance.
18.0 Harvest, transport, and install plant materials.
19.0 Identify procedures to operate, repair, and maintain tools and equipment.
20.0 Identify emerging technologies in the horticulture industry.
21.0 Demonstrate leadership, employability, communications, and human relations skills.
22.0 Identify business principles.
23.0 Manage inventory.

Nursery and Greenhouse Managers 1

24.0 Apply knowledge to identify and classify plants.
25.0 Control pests.
26.0 Operate tools and equipment.
27.0 Prepare growing media.
28.0 Irrigate plants.
29.0 Demonstrate proper fertilizing techniques.
30.0 Demonstrate abilities to maintain and analyze records.
31.0 Maintain tools and equipment.

Nursery and Greenhouse Managers 2

32.0 Demonstrate application of chemicals and calibrate spray equipment.
33.0 Develop irrigation and drainage plan.
34.0 Raise crop too point of sale.
35.0 Prune and shape nursery stock.
36.0 Harvest, process, and ship nursery stock.
37.0 Market nursery stock.
38.0 Operate, repair, and maintain nursery equipment and facilities.
39.0 Identify business principles.
40.0 Develop life cycle of equipment.

Florida Department of Education
Student Performance Standards

Program Title: **Nursery Management**
Career Certificate Program Number: **A010616**

Course Number: ORH0862 **Occupational Completion Point: A** **Nursery Workers – 300 Hours**	
01.0	Describe the horticulture industry. The student will be able to:
01.01	Describe the importance of horticulture to the American and global economies.
01.02	Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
01.03	Describe the importance of horticulture to the environment, including sustainability practices
01.04	Identify professional organizations and certifications for the horticultural industry.
02.0	Identify safety procedures in the workplace. The student will be able to:
02.01	Identify the common causes of accidents in the horticulture industry.
02.02	Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
02.03	Explain, identify, and utilize pertinent information from a container label and/or Safety Data Sheet (SDS) according to Environmental Protection Agency (EPA), Worker Protection Standard and Occupational Safety and Health Agency (OHSA) Regulations.
03.0	Identify and classify plants. The student will be able to:
03.01	Identify plants by scientific and common names.
03.02	Classify plants botanically.
03.03	Write scientific names for plants.
04.0	Demonstrate plant propagation techniques. The student will be able to:
04.01	Identify propagating and growing facilities and structures.
04.02	Prepare propagation media.
04.03	Select and collect propagation materials.

	04.04 Demonstrate propagation by sexual and asexual methods.
	04.05 Demonstrate environmental controls for propagation materials.
	04.06 Identify and select proper rooting hormones based on plant characteristics.
05.0	Identify growing media and fertilizers. The student will be able to:
	05.01 Identify soil and media materials.
	05.02 Identify nutritional needs of plants.
	05.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
	05.04 Identify types and kinds of fertilizers.
	05.05 Identify methods of distributing fertilizers.
	05.06 Interpret information on a label of fertilizer used in Florida.
06.0	Apply irrigation skills for plants and turf. The student will be able to:
	06.01 Identify water needs of plants.
	06.02 Irrigate plants at recommended rates.
	06.03 Identify the symptoms of excessive water and water stress in plants.
	06.04 Describe the basic irrigation systems and principles used in the landscape and nursery.
07.0	Demonstrate Integrated Pest Management approaches. The student will be able to:
	07.01 Identify common pests of plants.
	07.02 Describe life cycles of common pests of plants.
	07.03 Recognize signs of damage from pests.
08.0	Describe the principles and requirements of plant growth. The student will be able to:
	08.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.
	08.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.
	08.03 Explain the process of respiration and the flow of energy in plants.

	08.04 Describe the influence of light and temperature on plant growth including photo tropism.
09.0	Apply Best Management Practices in the horticulture industry. The student will be able to:
	09.01 Identify and apply Best Management Practices to reduce pollution and conserve water.
	09.02 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
	09.03 Compare and contrast organic verses traditional practices.
10.0	Identify principles of landscape design. The student will be able to:
	10.01 Compare and contrast the use of line, form, texture, and color in designing landscapes.
	10.02 Identify the principles of design (unity, repetition, balance, emphasis, and scale) as they apply to landscapes.
	10.03 Identify points of emphasis and major design areas in the residential landscape.
	10.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.
	10.05 Read and interpret a landscape plan.
	10.06 Develop skills for drawing and identifying symbols.
	10.07 Draw and design a landscape plan for a small garden.
	10.08 Construct a landscape display.
	10.09 Identify technology used for landscape design.
11.0	Apply safety procedures in the workplace. The student will be able to:
	11.01 Describe emergency procedures in the horticulture workplace.
	11.02 Create preventive measures to avoid hazardous situations.
	11.03 Apply problem solving skills to correct a hazardous situation.
12.0	Classify plants based on scientific principles. The student will be able to:
	12.01 Describe principles of plant biology and growth.
	12.02 Explain the role of plants in the ecosystem.
	12.03 Describe the major classifications of plants based on life cycle.

	12.04 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
	12.05 Demonstrate proper use of scientific names.
13.0	Demonstrate proper use of growing media and fertilizers. The student will be able to:
	13.01 Apply information on a label of fertilizer used in Florida.
	13.02 Apply fertilizer and soil amendments.
	13.03 Identify materials that are needed to alter pH and calculate the amount to apply to change the pH.
	13.04 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.
	13.05 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.
	13.06 Using references make fertilizer recommendations for ornamental plants, turf grass, and palms.
14.0	Demonstrate Integrated Pest Management approaches. The student will be able to:
	14.01 Classify insects according to feeding habits.
	14.02 Describe biological, chemical, and cultural methods of controlling plant pests.
	14.03 Diagnose and outline a plan for controlling pests on a horticultural crop.
	14.04 Describe methods of controlling nematode pests on ornamental plants.
	14.05 Develop a pest control program for a horticultural crop using Integrated Pest Management.
	14.06 Identify and apply Best Management Practices on the management and handling of pesticides.
15.0	Identify the principles and requirements of plant growth. The student will be able to:
	15.01 Demonstrate methods of pruning plants.
	15.02 Identify appropriate time to prune plants.
	15.03 Identify and select pruning tools.
	15.04 Demonstrate proper use of pruning tools and care.
	15.05 Identify Plant Growth Regulators (PRG) and their use on horticulture and landscape plants.
	15.06 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.

	15.07 Identify specific cultural, mechanical, chemical, and biological methods of weed management.
16.0	Apply best management practices in landscape design. The student will be able to:
	16.01 Identify and apply Best Management Practices for the design and installation of landscapes.
17.0	Apply principles of landscape design and maintenance. The student will be able to:
	17.01 Demonstrate the use of line, form, texture and color in designing landscapes.
	17.02 Demonstrate the principles of design (unity, repetition, balance, emphasis and scale) as they apply to landscapes.
	17.03 Apply points of emphasis and major design areas in the commercial landscape.
	17.04 Identify plant selection for a commercial landscape using Florida Friendly Landscape principles.
	17.05 Create a landscape plan for a residential or commercial property.
	17.06 Calculate materials needed according to the identified landscape plan (e.g. cost analysis).
	17.07 Identify factors in selecting turf for landscape installation.
18.0	Harvest, transport, and install plant materials. The student will be able to:
	18.01 Determine requirements for preserving plant viability.
	18.02 Demonstrate proper landscape plant establishment techniques.
	18.03 Select and prepare plants for transporting and transplanting.
	18.04 Select horticultural products according to Florida grades and standards.
19.0	Identify procedures to operate, repair, and maintain tools and equipment. The student will be able to:
	19.01 Perform equipment pre-operational check.
	19.02 Identify, maintain, and operate hand tools and power tools.
20.0	Identify emerging technologies in the horticulture industry. The student will be able to:
	20.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
	20.02 Evaluate advances in biotechnology that impact horticulture. (e.g., transgenic crops, biological controls, micro propagation drones, mechanical technology, etc.).
21.0	Demonstrate leadership, employability, communications, and human relations skills. The student will be able to:

	21.01 Identify acceptable work habits and personal characteristics.
	21.02 Identify acceptable employee hygiene habits.
	21.03 Identify or demonstrate appropriate responses to criticism from employer,
	21.04 Describe the importance of industry certifications.
	21.05 Create a resume and portfolio.
22.0	Identify business principles. The student will be able to:
	22.01 Calculate markup, gross margin, and gross profit.
	22.02 Evaluate a Profit and Loss (P&L) statement.
	22.03 Prepare a pro forma for business.
	22.04 Write a business plan.
23.0	Manage inventory. The student will be able to:
	23.01 Take an inventory.
	23.02 Recognize usage of barcodes.
	23.03 Identify and manage Stock Keeping Units (SKUs).

Course Number: ORH0863 **Occupational Completion Point: B** **Nursery and Greenhouse Managers 1 – 450 Hours**	
24.0	Apply knowledge to identify and classify plants. The student will be able to:
	24.01 Classify plants as monocots or dicots.
	24.02 Classify plants as annuals, biennials, and perennials.
	24.03 Identify plants appropriate to a region.
	24.04 Classify plants according to growth habit.
	24.05 Prepare propagation materials (seeds, cuttings, etc.) for planting.

	24.06 Apply growth stimulants to propagation materials.
	24.07 Demonstrate greenhouse sanitation and safety practices when propagating.
	24.08 Prepare flats and seedbeds and plant seeds.
25.0	Control pests. The student will be able to:
	25.01 Report insect and disease damage.
	25.02 Identify chemical spray damage.
	25.03 Select proper IPM practices (biological, chemical, organic, and physical) for control of insects, diseases, vertebrates, and weeds.
	25.04 Evaluate the efficacy and phytotoxicity of a chemical prior to inclusion in a growing program.
26.0	Operate tools and equipment. The student will be able to:
	26.01 Identify, operate, and maintain tractor and power equipment.
	26.02 Load, secure, and transport equipment.
27.0	Prepare growing media. The student will be able to:
	27.01 Sterilize rooting, potting, and growing media.
	27.02 Adjust pH and nutritional levels of media.
	27.03 Fill and level benches and pots with media.
	27.04 Demonstrate sanitation practices when handling and storing plant media materials.
	27.05 Identify procedures for tissue culture.
28.0	Irrigate plants. The student will be able to:
	28.01 Set up an irrigation system for a propagation area.
	28.02 Set up an irrigation system for a growing structure.
	28.03 Set up an irrigation system for a retail display.
	28.04 Maintain and repair an irrigation system.
	28.05 Identify and use various types of irrigation systems (low volume, ebb and flow, drip, mat, recirculating, etc.).

	28.06 Explain and apply Best Management Practices as they apply to irrigation.
29.0	Demonstrate proper fertilizing techniques. The student will be able to:
	29.01 Collect soil and leaf tissue samples for analysis.
	29.02 Interpret and evaluate the results of soil and leaf tissue analysis and determine corrective actions.
	29.03 Demonstrate proper handling and storage of fertilizers, observing safety precautions.
	29.04 Evaluate, operate, and maintain fertilizer distribution equipment.
	29.05 Develop a fertilization schedule for various plant species.
	29.06 Determine rate of fertilizer application.
30.0	Demonstrate abilities to maintain and analyze records. The student will be able to:
	30.01 Create a plant and inventory supply list.
	30.02 Maintain current plant and supply inventory.
	30.03 Maintain job records, daily log sheets, and inventory.
	30.04 Calculate labor and material costs involved with product pricing.
	30.05 Analyze and maintain production and sales records.
	30.06 Determine plant production costs.
	30.07 Prepare a budget.
31.0	Maintain tools and equipment. The student will be able to:
	31.01 Maintain oil level in engines of power equipment.
	31.02 Check and maintain tire air pressure on equipment.
	31.03 Maintain fuel levels using proper fuel or fuel mixtures.
	31.04 Demonstrate proper equipment operations.
	31.05 Identify, operate, and maintain tractor and power equipment.

Course Number: ORH0864 Occupational Completion Point: C Nursery and Greenhouse Managers 2 – 150 Hours	
32.0	Demonstrate application of chemicals and calibrate spray equipment. The student will be able to:
32.01	Select, mix, apply, and record a non-restricted chemical according to the label and local, state, federal, and EPA regulations.
32.02	Discuss appropriate responses to chemical or fertilizer spills and proper disposal practices.
32.03	Identify and report insect and disease damage on plants and turf.
32.04	Diagnose a plant or disease problem on turf.
33.0	Develop irrigation and drainage plan. The student will be able to:
33.01	Identify drainage components for different types of drainage systems.
33.02	Install irrigation systems with control valves and clocks.
33.03	Set up an irrigation system for a growing area.
33.04	Comply with local, state, and federal conservation guidelines.
34.0	Raise crop to point of sale. The student will be able to:
34.01	Choose plant, container, media, and growing structure.
34.02	Apply sound cultural practices.
34.03	Use Integrated Pest Management to raise crop (i.e., fertilizer, growth retardants, pesticides).
34.04	Schedule crop for sale.
34.05	Maintain production records
35.0	Prune and shape nursery stock. The student will be able to:
35.01	Prune plants to achieve desired growth and shape.
35.02	Explore the use of chemical growth regulators.
35.03	Identify techniques for pruning specialty items (topiary, bonsai).

36.0	Harvest, process, and ship nursery stock. The student will be able to:
	36.01 Determine customer needs per landscape plan.
	36.02 Grade and harvest field-grown plants (ball, burlap, bare-root, "grow bags").
	36.03 Identify mechanical techniques for harvesting field-grown plants (tree spade and mechanical digger).
	36.04 Select and assemble container-grown plants using industry-accepted grades and standards.
	36.05 Prepare for shipment, loading, and transporting harvested plant materials.
	36.06 Comply with regulations regarding the inspection and movement of plant materials.
	36.07 Demonstrate safety practices when harvesting, processing, and shipping nursery stock.
	36.08 Determine proper shipping environment.
37.0	Market nursery stock. The student will be able to:
	37.01 Label and merchandise plants including plant care tags, bar codes, and shipping instructions.
	37.02 Maintain clean and attractive merchandising and display areas safely.
	37.03 Use various advertising methods to promote sales.
	37.04 Demonstrate procedures for taking a sale order.
	37.05 Use sales catalog.
	37.06 Demonstrate proper customer etiquette.
	37.07 Describe care and use of plants and related products to customers.
	37.08 Handle customer complaints and problems.
38.0	Operate, repair, and maintain nursery equipment and facilities. The student will be able to:
	38.01 Determine equipment needs for the job.
	38.02 Order parts and supplies.
	38.03 Perform simple electrical repairs.
	38.04 Build or repair frames, benches, and other greenhouse or nursery facilities.

	38.05 Demonstrate safety practices when working with equipment and facilities.
39.0	Identify business principles. The student will be able to:
	39.01 Describe principles of business management.
	39.02 Describe business organizational structures.
	39.03 Cite financial management methods.
	39.04 Interpret laws, regulations, and codes pertinent to the nursery industry.
40.0	Develop life cycle of equipment. The student will be able to:
	40.01 Analyze the cost of replacing equipment verses repairing equipment.
	40.02 Evaluate lease verses purchase of equipment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Extended Student Supervision
Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Reading and Language Arts). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02, Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01, F.S., may also be exempted from meeting the Basic Skills requirement. Each school district and Florida College System Institution must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91, F.S.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as

instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Program Title: **Landscape & Turf Management**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Career Certificate Program		
Program Number	A200100	
CIP Number	0101060703	
Grade Level	30, 31	
Program Length	900 hours	
Teacher Certification	Refer to the **Program Structure** section.	
CTSO	N/A	
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.	
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level	Computation (Mathematics): 9	Communications (Reading and Language Arts): 9

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the horticulture and landscape industries within the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues, and health, safety and environmental issues.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points. Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, or (4) cooperative education.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	ORH0862	Nursery Workers	AGRICULTUR 1 @2 HORTICULT #7	300 hours
B	ORH0802	Landscaping and Grounds Keeping		450 hours
C	ORH0803	Landscaping and Grounds Keeping Supervisors		150 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Nursery Workers

01.0 Describe the horticulture industry.
02.0 Identify safety procedures in the workplace.
03.0 Identify and classify plants.
04.0 Demonstrate plant propagation techniques.
05.0 Identify growing media and apply fertilizers.
06.0 Apply irrigation skills for plants and turf.
07.0 Demonstrate integrated pest management approaches.
08.0 Describe the principles and requirements for plant growth.
09.0 Apply best management practices in horticulture industry.
10.0 Identify principles of landscape design.
11.0 Apply safety procedures in the workplace.
12.0 Classify plants based on scientific principles.
13.0 Demonstrate proper use of growing media and fertilizers.
14.0 Demonstrate Integrated Pest Management approaches.
15.0 Identify the principles and requirements of plant growth.
16.0 Apply best management practices in landscape design.
17.0 Apply principles of landscape design and maintenance.
18.0 Harvest, transport, and install plant materials.
19.0 Identify procedures to operate, repair, and maintain tools and equipment.
20.0 Identify emerging technologies in the horticulture industry.
21.0 Demonstrate leadership, employability, communications and human relations skills.
22.0 Identify business principles.
23.0 Manage inventory.

Landscaping and Groundskeeping

24.0 Maintain tools and equipment.
25.0 Demonstrate application of chemicals and calibrate spray equipment.
26.0 Classify plants and turfgrass.
27.0 Demonstrate fertilization skills.
28.0 Irrigate plants and turf.
29.0 Layout and install landscape and/or interiorscape.
30.0 Maintain landscape.
31.0 Maintain customer relations and observe follow-up procedures.

Landscape and Groundskeeping Supervisors

32.0 Analyze and design landscape.
33.0 Prepare estimates, contracts, and presentation.
34.0 Lay out and install landscape and turf.
35.0 Conduct final walk-through of landscape installation.
36.0 Identify components of athletic fields.
37.0 Maintain athletic fields.
38.0 Develop recreational areas.
39.0 Maintain sports turf.
40.0 Establish turfgrass.
41.0 Tending and rejuvenating turf.
42.0 Determine drainage system needs and design a drainage system.
43.0 Develop life cycle of equipment.

Florida Department of Education
Student Performance Standards

Program Title: Landscape & Turf Management
Career Certificate Program Number: A200100

Course Number: ORH0862 **Occupational Completion Point: A** **Nursery Workers – 300 Hours**	
01.0	Describe the horticulture industry. The student will be able to:
01.01	Describe the importance of horticulture to the American and global economies.
01.02	Identify career opportunities in horticulture and educational requirements and continuing education opportunities for horticulture careers.
01.03	Describe the importance of horticulture to the environment, including sustainability practices
01.04	Identify professional organizations and certifications for the horticultural industry.
02.0	Identify safety procedures in the workplace. The student will be able to:
02.01	Identify the common causes of accidents in the horticulture industry.
02.02	Demonstrate proper safety precautions and use of personal protective equipment specific to the horticulture industry.
02.03	Explain, identify, and utilize pertinent information from a container label and/or Safety Data Sheet (SDS) according to Environmental Protection Agency (EPA), Worker Protection Standard and Occupational Safety and Health Agency (OHSA) Regulations.
03.0	Identify and classify plants. The student will be able to:
03.01	Identify plants by scientific and common names.
03.02	Classify plants botanically.
03.03	Write scientific names for plants.
04.0	Demonstrate plant propagation techniques. The student will be able to:
04.01	Identify propagating and growing facilities and structures.
04.02	Prepare propagation media.
04.03	Select and collect propagation materials.

	04.04 Demonstrate propagation by sexual and asexual methods.
	04.05 Demonstrate environmental controls for propagation materials.
	04.06 Identify and select proper rooting hormones based on plant characteristics.
05.0	Identify growing media and fertilizers. The student will be able to:
	05.01 Identify soil and media materials.
	05.02 Identify nutritional needs of plants.
	05.03 Identify symptoms of nutritional deficiencies and toxicities of plants.
	05.04 Identify types and kinds of fertilizers.
	05.05 Identify methods of distributing fertilizers.
	05.06 Interpret information on a label of fertilizer used in Florida.
06.0	Apply irrigation skills for plants and turf. The student will be able to:
	06.01 Identify water needs of plants.
	06.02 Irrigate plants at recommended rates.
	06.03 Identify the symptoms of excessive water and water stress in plants.
	06.04 Describe the basic irrigation systems and principles used in the landscape and nursery.
07.0	Demonstrate Integrated Pest Management approaches. The student will be able to:
	07.01 Identify common pests of plants.
	07.02 Describe life cycles of common pests of plants.
	07.03 Recognize signs of damage from pests.
08.0	Describe the principles and requirements of plant growth. The student will be able to:
	08.01 Explain how the energy of sunlight is converted to chemical energy through the process of photosynthesis.
	08.02 Explain how photosynthesis in plants is directly affected by various environmental factors such as light and temperature.
	08.03 Explain the process of respiration and the flow of energy in plants.

	08.04 Describe the influence of light and temperature on plant growth including photo tropism.
09.0	Apply Best Management practices in the horticulture industry. The student will be able to:
	09.01 Identify and apply Best Management Practices to reduce pollution and conserve water.
	09.02 Identify and apply Best Management Practices on fertilizer recommendations for Florida plants and turf.
	09.03 Compare and contrast organic verses traditional practices.
10.0	Identify principles of landscape design. The student will be able to:
	10.01 Compare and contrast the use of line, form, texture, and color in designing landscapes.
	10.02 Identify the principles of design (unity, repetition, balance, emphasis, and scale) as they apply to landscapes.
	10.03 Identify points of emphasis and major design areas in the residential landscape.
	10.04 Identify plant selection for a residential landscape using Florida Friendly Landscape Principles.
	10.05 Read and interpret a landscape plan.
	10.06 Develop skills for drawing and identifying symbols.
	10.07 Draw and design a landscape plan for a small garden.
	10.08 Construct a landscape display.
	10.09 Identify technology used for landscape design.
11.0	Apply safety procedures in the workplace. The student will be able to:
	11.01 Describe emergency procedures in the horticulture workplace.
	11.02 Create preventive measures to avoid hazardous situations.
	11.03 Apply problem solving skills to correct a hazardous situation.
12.0	Classify plants based on scientific principles. The student will be able to:
	12.01 Describe principles of plant biology and growth.
	12.02 Explain the role of plants in the ecosystem.
	12.03 Describe the major classifications of plants based on life cycle.

	12.04 Demonstrate the use of scientific and common names of plants including genus and specific epithet and cultivar.
	12.05 Demonstrate proper use of scientific names.
13.0	Demonstrate proper use of growing media and fertilizers. The student will be able to:
	13.01 Apply information on a label of fertilizer used in Florida.
	13.02 Apply fertilizer and soil amendments.
	13.03 Identify materials that are needed to alter pH and calculate the amount to apply to change the pH.
	13.04 Demonstrate the procedure for calibrating a fertilizer spreader or injector using appropriate mathematical concepts.
	13.05 Identify essential elements and nutrients in plant growth including macronutrients and micronutrients.
	13.06 Using references make fertilizer recommendations for ornamental plants, turf grass, and palms.
14.0	Demonstrate Integrated Pest Management approaches. The student will be able to:
	14.01 Classify insects according to feeding habits.
	14.02 Describe biological, chemical, and cultural methods of controlling plant pests.
	14.03 Diagnose and outline a plan for controlling pests on a horticultural crop.
	14.04 Describe methods of controlling nematode pests on ornamental plants.
	14.05 Develop a pest control program for a horticultural crop using Integrated Pest Management.
	14.06 Identify and apply Best Management Practices on the management and handling of pesticides.
15.0	Identify the principles and requirements of plant growth. The student will be able to:
	15.01 Demonstrate methods of pruning plants.
	15.02 Identify appropriate time to prune plants.
	15.03 Identify and select pruning tools.
	15.04 Demonstrate proper use of pruning tools and care.
	15.05 Identify Plant Growth Regulators (PGR) and their use on horticulture and landscape plants.
	15.06 Outline and use a record book for the use of a plant growth regulator on a horticultural or nursery crop.

	15.07 Identify specific cultural, mechanical, chemical, and biological methods of weed management.
16.0	Apply Best Management Practices in landscape design. The student will be able to:
	16.01 Identify and apply Best Management Practices for the design and installation of landscapes.
17.0	Apply principles of landscape design and maintenance. The student will be able to:
	17.01 Demonstrate the use of line, form, texture, and color in designing landscapes.
	17.02 Demonstrate the principles of design (unity, repetition, balance, emphasis, and scale) as they apply to landscapes.
	17.03 Apply points of emphasis and major design areas in the commercial landscape.
	17.04 Identify plant selection for a commercial landscape using Florida Friendly Landscape principles.
	17.05 Create a landscape plan for a residential or commercial property.
	17.06 Calculate materials needed according to the identified landscape plan (e.g., cost analysis).
	17.07 Identify factors in selecting turf for landscape installation.
18.0	Harvest, transport, and install plant materials. The student will be able to:
	18.01 Determine requirements for preserving plant viability.
	18.02 Demonstrate proper landscape plant establishment techniques.
	18.03 Select and prepare plants for transporting and transplanting.
	18.04 Select horticultural products according to Florida grades and standards.
19.0	Identify procedures to operate, repair, and maintain tools and equipment. The student will be able to:
	19.01 Perform equipment pre-operational check.
	19.02 Identify, maintain, and operate hand tools and power tools.
20.0	Identify emerging technologies in the horticulture industry. The student will be able to:
	20.01 Investigate DNA and genetics applications in horticulture including the theory of probability.
	20.02 Evaluate advances in biotechnology that impact horticulture. (e.g., transgenic crops, biological controls, micro propagation, drones, mechanical technology, etc.).
21.0	Demonstrate leadership, employability, communications, and human relations skills. The student will be able to:

	21.01 Identify acceptable work habits and personal characteristics.
	21.02 Identify acceptable employee hygiene habits.
	21.03 Identify or demonstrate appropriate responses to criticism from employer,
	21.04 Describe the importance of industry certifications.
	21.05 Create a resume and portfolio.
22.0	Identify business principles. The student will be able to:
	22.01 Calculate markup, gross margin, and gross profit.
	22.02 Evaluate a Profit and Loss (P&L) statement.
	22.03 Prepare a pro forma for business.
	22.04 Write a business plan.
23.0	Manage inventory. The student will be able to:
	23.01 Take an inventory.
	23.02 Recognize usage of barcodes.
	23.03 Identify and manage Stock Keeping Units (SKUs).

Course Number: ORH0802 Occupational Completion Point: B Landscaping and Groundskeeping – 450 Hours	
24.0	Maintain tools and equipment. The student will be able to:
	24.01 Maintain oil level in engines of power equipment.
	24.02 Check and maintain tire air pressure on equipment.
	24.03 Maintain fuel levels using proper fuel or fuel mixtures (alternative fuels).
	24.04 Operate transmissions (hydrostatic, manual, automatic).
	24.05 Identify, operate, and maintain tractor and power equipment.

	24.06 Service and maintain battery and electrical systems.
	24.07 Perform minor tune-up on engines.
	24.08 Load, secure, and transport equipment.
	24.09 Demonstrate safety precautions while working with tools and equipment.
25.0	Demonstrate application of chemicals and calibrate spray equipment. The student will be able to:
	25.01 Select, mix, apply, and record a non-restricted chemical according to the label and local, state, federal, and EPA regulations.
	25.02 Calibrate spray and spreader equipment.
	25.03 Discuss appropriate responses to chemical or fertilizer spills.
	25.04 Identify and report insect and disease damage on plants and turf.
	25.05 Diagnose a plant or disease problem on turf.
	25.06 Identify and report insect and disease damage.
	25.07 Determine chemical compatibility.
	25.08 Determine appropriate time frequency and method of chemical application.
	25.09 Identify current certification and licensure.
26.0	Classify plants and turfgrass. The student will be able to:
	26.01 Classify plants and turfgrass as annuals, biennials, and perennials.
	26.02 Identify plants and turfgrass that are specific to a region.
	26.03 Identify common weeds in Florida turf grasses.
27.0	Demonstrate fertilization skills. The students will be able to:
	27.01 Develop a fertilization schedule.
	27.02 Interpret fertilizer charts and develop recommendations according to turf species.
	27.03 Calibrate fertilizer equipment.
28.0	Irrigate plants and turf. The student will be able to:

	28.01 Identify various types of irrigation systems.
	28.02 Install and maintain piping and water distribution components.
	28.03 Install valves, timers, rain shut-offs, moisture sensors, and back flow prevention devices.
	28.04 Design a microirragation system.
	28.05 List problems associated with improper design, installation, and maintenance.
	28.06 Identify water for irrigation.
	28.07 Interpret water source test results.
	28.08 Identify remediation practice and tools available to address water quality issues.
29.0	Layout and install landscape and/or interiorscape. The student will be able to:
	29.01 Prepare landscape and/or interiorscape.
	29.02 Prepare final grade.
	29.03 Calculate labor and material costs associated with installation.
	29.04 Layout plants based on a landscape plan.
	29.05 Plant site using sound cultural practices.
	29.06 Install mulch and perform final cleanup.
30.0	Maintain landscape. The student will be able to:
	30.01 Perform maintenance inspection of the project.
	30.02 Determine water requirements and apply at proper rates.
	30.03 Identify weeds and apply herbicides safely.
	30.04 Determine fertilization requirements and apply at proper rates.
	30.05 Identify plant pest and disease problems and apply corrective measures.
	30.06 Trim and prune landscape plants.
	30.07 Maintain turf viability; mow at proper height and frequency, blade edge, line trim, and remove trash.

	30.08 Explain cause and effect of soil compaction and thatch buildups and determine appropriate methods of correction.
	30.09 Cultivate and mulch plants.
	30.10 Prune trees based on ANSI (American National Standard Institute) standards.
	30.11 Provide protection for plants from adverse weather conditions.
	30.12 Comply with local, state, and federal regulations regarding landscape maintenance and pesticide applications.
	30.13 Demonstrate sanitation and safety practices when maintaining landscape.
31.0	Maintain customer relations and observe follow-up procedures. The student will be able to:
	31.01 Conduct walk-through of project with client to assure satisfaction.
	31.02 Identify current and future maintenance requirements.
	31.03 Analyze project records for profitability and employee performance.
	31.04 Create a date base for Client Relation Management (CRM).

Course Number: ORH0803 Occupational Completion Point: C Landscape and Grounds keeping Supervisors – 150 Hours	
32.0	Analyze and design landscape. The student will be able to:
	32.01 Analyze and interpret plans, specifications, and environmental conditions of the project.
	32.02 Design the project.
	32.03 Identify and locate project materials.
	32.04 Determine personnel and equipment needs and safety requirements for the project.
	32.05 Establish project schedule.
33.0	Prepare estimates, contracts, and presentation. The student will be able to:
	33.01 Determine costs of materials, equipment, and labor.
	33.02 Prepare a price for the project and terms of contract.

	33.03 Prepare written contract, using standard rules of English, including punctuation, spelling, sentence structure and references.
	33.04 Prepare and give oral presentation of the project design using standard rules of English, including punctuation and sentence structure.
	33.05 Maintain job records, daily log sheets, and inventory.
34.0	Lay out and install landscape and turf. The student will be able to:
	34.01 Locate existing utilities and secure a permit.
	34.02 Prepare and rough grade the site.
	34.03 Determine procedures for installation of large materials.
	34.04 Install and test irrigation system.
	34.05 Identify procedures for constructing hardscape (walls, walks, patios, drives, etc.).
	34.06 Identify and consult with hardscape organizations.
35.0	Conduct final walk-through of landscape installation. The student will be able to:
	35.01 Conduct walk-through of installation project with client to assure customer satisfaction.
	35.02 Analyze project records for profitability and employee performance.
36.0	Identify components of athletic fields. The student will be able to:
	36.01 Identify turf selection for various athletic fields.
	36.02 Identify appropriate dimensions for different athletic fields and specific requirements.
	36.03 Design an underground drainage system.
37.0	Maintain athletic fields. The student will be able to:
	37.01 Apply proper line marks for athletic fields.
	37.02 Painting fields (school logos or names).
	37.03 Apply proper techniques for clay maintenance.
	37.04 Mow grass to appropriate height for field use.
38.0	Develop recreational areas. The student will be able to:

	38.01 Establish plant beds with annuals, biennials, and perennials.
	38.02 Plant accent trees and shrubs in a recreational area.
	38.03 Establish sports turf.
39.0	Maintain sports turf. The student will be able to:
	39.01 Mow sport turf with reel mowers.
	39.02 Irrigate turf.
	39.03 Verticut turf.
	39.04 Aerate turf and remove debris.
40.0	Establish turfgrass. The student will be able to:
	40.01 Level seedbed.
	40.02 Plant turf by sprigs, plugs or sod.
	40.03 Remove sod with sod cutter.
	40.04 Identify irrigation methods for establishing turfgrass.
41.0	Tending and rejuvenating turf. The student will be able to:
	41.01 Apply top dressing.
	41.02 Overseed turf.
	41.03 Irrigate turf.
	41.04 Aerate turf.
	41.05 Apply fertilizer.
42.0	Determine drainage system needs and design a drainage system. The student will be able to:
	42.01 Determine the natural slope/grade of an area.
	42.02 Determine the texture and percolation characteristics of the soil.
	42.03 Identify techniques for constructing ditches and culverts.

	42.04 Design and underground drainage system.
43.0	Develop life cycle of equipment. The student will be able to:
	43.01 Analyze the cost of replacing equipment verses repairing equipment.
	43.02 Evaluate lease verses purchase of equipment.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Extended Student Supervision
Because of the production and marketing cycle of the agricultural industries, this program requires individual instruction and supervision of students for the entire period beyond the 180-day school year.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Basic Skills

In Career Certificate Programs offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C., the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Computation (Mathematics) and Communications (Reading and Language Arts). These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

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Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as

instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

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Florida Department of Education
Student Performance Standards

Course Title: **Agriscience Foundations 1**
Course Number: **8106810**
Course Credit: **1**

Course Description:

This core course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

Course Structure

Planned and Supervised Agricultural Experiences (SAE) must be provided through one or more of the following: (1) foundational career exploration, (2) directed laboratory experience, (3) project ownership/entrepreneurship, (4) cooperative education/internship, (5) School Based Enterprise or (6) Service Learning.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8106810	Agriscience Foundations 1	AGRICUTUR 1 @2 AGRICULTURE 7 G	1 credit		3	EQ

(Graduation Requirement Codes: CT= Career & Technical Education, EQ= Equally Rigorous Science, EC= Economics, MA= Mathematics, PL= Personal Financial Literacy)

CTE Standards and Benchmarks	
01.0	Examine the history of AFNR production at the local, national, and global level. The student will be able to:
01.01	Analyze and describe the impact of AFNR industries on local, state, national, and global economies.
01.02	Investigate and summarize historical developments, inventions, or events that have impacted AFNR production systems.
01.03	Examine and analyze historical and current economic or production data and trends and determine their impact on local, state, national, and global AFNR systems.
02.0	Employ scientific reasoning to make informed decisions in AFNR systems. The student will be able to:
02.01	Design and complete an experiment using the scientific method.
02.02	Employ scientific measuring skills.
02.03	Demonstrate safe and effective use of common laboratory equipment.
02.04	Analyze, interpret, and report data from research.
02.05	Utilize data to make an informed choice concerning AFNR systems.
03.0	Apply scientific skills and principles in natural resources. The student will be able to:
03.01	Describe the environmental resources (soil, water, air) necessary for agricultural production.
03.02	Classify resources used in AFNR systems as renewable or nonrenewable.
03.03	Discuss the management of renewable vs. non-renewable natural resources.
03.04	Describe various Florida ecosystems as they relate to the agricultural industry.
03.05	Examine the effects of environmental regulations on ANFR industries.
03.06	Research Best Management Practices that sustain the natural environment.
03.07	Examine how land use decisions (development, conservation, agricultural production, etc.) impact the environment.
03.08	Explore employment and entrepreneurship opportunities and identify potential paths to careers in natural resources.
04.0	Apply scientific skills and principles in plant science. The student will be able to:
04.01	Describe and differentiate between plant industry sectors (floriculture, nursery, forestry, etc.).

CTE Standards and Benchmarks	
	04.02 Examine products and by-products produced commercially in plant industries.
	04.03 Distinguish cellular processes in plant science including photosynthesis, respiration, transpiration.
	04.04 Categorize plants based on specific characteristics according to industry and scientific standards.
	04.05 Investigate and compare methods of plant reproduction.
	04.06 Identify nutrient requirements for optimal plant growth, their functions within plants and nutrient sources.
	04.07 Manage plant production facilities, equipment and supplies with a safety mindset.
	04.08 Evaluate advances in plant related biotechnology that impact consumers and production.
	04.09 Explore employment and entrepreneurship opportunities and identify potential paths to careers in plant science.
05.0	Apply scientific skills and principles in animal science. The student will be able to:
	05.01 Distinguish correct terminologies for livestock species and conditions (e.g., age, sex, and use) within those species.
	05.02 Recognize commercially important livestock variations distinguishable in breed characteristics (e.g., cattle, swine, sheep, goats and poultry).
	05.03 Examine production and consumption trends of commercially important livestock species.
	05.04 Model safe animal handling practices using proper safety procedures.
	05.05 Examine products and by-products produced by commercially important livestock species.
	05.06 Identify methods of proper disposal of animal waste materials and biohazards.
	05.07 Evaluate advances in animal biotechnology that impact consumer and production decisions (e.g., cloning, selective breeding and pharmaceuticals).
	05.08 Apply genetic principles to improve animal husbandry practices.
	05.09 Compare and contrast animal welfare issues.
	05.10 Manage animal facilities, equipment and supplies with a safety mindset.
	05.11 Explore employment and entrepreneurship opportunities and identify potential paths to careers in animal science.
06.0	Apply scientific skills and principles in food science. The student will be able to:

CTE Standards and Benchmarks	
	06.01 Evaluate the relationship between food markets and consumer trends.
	06.02 Examine the impact of consumer demands on food production, processing and storage.
	06.03 Evaluate advances in biotechnology that impact agriculture.
	06.04 Analyze the impact of marketing and labeling of food products on consumer behavior.
	06.05 Perform safe handling practices in the preparation of food.
	06.06 Explore employment and entrepreneurship opportunities and identify potential paths to careers in food science.
07.0	Apply scientific skills and principles in power, structure, and technical systems. The student will be able to:
	07.01 Analyze trends and emerging technological advances in power, structure and technical systems.
	07.02 Select the appropriate tool for construction, repair, and maintenance of power, structure and technical systems.
	07.03 Demonstrate safe use of common tools used for construction, repair, and maintenance of power, structure and technical systems.
	07.04 Utilize commonly used technologies in AFNR systems to solve problems in AFNR systems.
	07.05 Manage power, structure, and technical systems facilities, equipment and supplies with a safety mindset.
	07.06 Explore employment and entrepreneurship opportunities in power, structure and technical systems.
08.0	Explore AFNR professional development organizations. The student will be able to:
	08.01 Identify the opportunities for leadership development available through the National FFA Organization and other agricultural groups.
	08.02 Explore the history of the National FFA Organization.
	08.03 Participate in a business meeting using Robert's Rules of Order.
	08.04 Model leadership characteristics.
	08.05 Develop a plan for personal and professional growth in an agricultural organization by reviewing their mission statement, constitution and by-laws and program of activities.

Florida Department of Education
Curriculum Framework

Program Title: **Water Treatment Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Career Certificate Program	
Program Number	P150507
CIP Number	0715050603
Grade Level	30, 31
Program Length	405 hours
Teacher Certification	Refer to the **Program Structure** section.
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	N/A

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the career Agriculture, Food and Natural Resources cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Water Treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to source water or influent characteristics; treatment facility unit processes and operational techniques; water quality and identification; identifying treatment goals and measuring their achievement; disinfection; process control techniques; sampling, testing, and laboratory analysis; supervision; operation maintenance and inspection of facility equipment; application of current DEP regulations and standards; facility administration and management techniques; and troubleshooting operational control problems. The emphasis is on skills that are needed for effective treatment process control and troubleshooting.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	EVS0133	Water Treatment Plant Operator C	WSP OPER 7G	155 hours
B	EVS0143	Water Treatment Plant Operator B		130 hours
C	EVS0153	Water Treatment Plant Operator A		120 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Water Treatment Plant Operator C

01.0 Identify professions related to the water technology field.
02.0 Identify scientific concepts common in water and wastewater treatment.
03.0 Identify safety hazards associated with water technologies.
04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
05.0 Solve basic math problems common to water technologies.
06.0 Define pumping and basic hydraulic principles.
07.0 Define principles of disinfection.
08.0 Define sampling techniques.
09.0 Define federal, state, and local regulations that apply to water technologies.
10.0 Demonstrate employability skills.
11.0 Identify sampling techniques and explain the significance of the steps.
12.0 Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems.
13.0 Describe the principles, operational and troubleshooting practices of the aeration process.
14.0 Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes.
15.0 Describe the principles, operational and troubleshooting practices of the sedimentation process.
16.0 Describe the principles, operational and troubleshooting practices of the filtration process.
17.0 Describe the principles, operational and troubleshooting practices of the water-softening process.
18.0 Describe the principles, operational and troubleshooting practices of the stabilization process.
19.0 Describe the principles, operational and troubleshooting practices of the corrosion-control process.
20.0 Describe the principles, operational and troubleshooting practices of the disinfection process.
21.0 Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes.
22.0 Describe the principles, operational and troubleshooting practices of the iron-and manganese-removal processes.
23.0 Describe the principles, operational and troubleshooting practices for taste and odor control.
24.0 Describe the principles, operational and troubleshooting practices of the demineralization processes.
25.0 Describe the principles, operational and troubleshooting practices of the fluoridation process.
26.0 Identify facility operational problems.
27.0 Describe basic hydraulics and pumping operations.
28.0 Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility.
29.0 Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management.

Water Treatment Plant Operator B

30.0 Analyze the constituents of water and select the appropriate treatment.
31.0 Identify advanced sampling techniques and interpret the results.
32.0 Solve algebra, ratio, and proportion problems in the water treatment process.
33.0 Demonstrate process optimization for water treatment.

34.0 Analyze and correct facility operational problems.
35.0 Demonstrate equipment inspection and preventive maintenance for water treatment.
36.0 Apply appropriate federal, state and local regulations for operation and management of a public potable water facility.
37.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
38.0 Describe energy conservation and identify ways to conserve energy in the water treatment facility.
39.0 Demonstrate supervisory skills.

Water Treatment Plant Operator A

40.0 Describe theoretical facility management skills.
41.0 Demonstrate methods of organization and control.
42.0 Develop a plan for cost management.
43.0 Prepare budgets and personnel assignments.
44.0 Develop standard operating procedures for the training and orientation of new employees.
45.0 Demonstrate personnel selection and discipline.
46.0 Demonstrate contingency planning.
47.0 Develop a plan for energy conservation.
48.0 Describe record keeping and use of computer applications in planning.
49.0 Explain process optimization for water or wastewater treatment facilities.
50.0 Interpret permits and blueprints.
51.0 Develop a laboratory plan for process control.
52.0 Discuss public-relations skills in community interactions.

Florida Department of Education
Student Performance Standards

Program Title: **Water Treatment Technologies**
Career Certificate Program Number: **P150507**

Course Number: EVS0133 **Occupational Completion Point: A** **Water Treatment Plant Operator C – 155 Hours**	
01.0	Identify professions related to the water technology field. The student will be able to:
01.01	List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.
01.02	Identify the basic terms and concepts involved in processes used in these professions.
01.03	List potential employers in the water technology field: federal, municipal, county, state and private.
01.04	Identify resources to assist in finding employment in the field.
01.05	Identify professional organizations related to the water technology field.
01.06	Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.
02.0	Identify scientific concepts common in water and wastewater treatment. The student will be able to:
02.01	Identify chemical symbols used in water and wastewater treatment.
02.02	Describe the hydrologic cycle.
02.03	Describe the basic concepts of the pH scale and its importance in the treatment process.
02.04	Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
02.05	Identify principle states of matter: liquid, solid, and gas.
02.06	Identify the basic nitrogen, phosphorous, and carbon cycles.
03.0	Identify safety hazards associated with water technologies. The student will be able to:
03.01	Identify the types of hazards common to water technology facilities.
03.02	Recognize unsafe conditions and prescribe corrective measures.

	03.03 Identify and safely handle hazardous chemicals common to water technology facilities.
	03.04 Recognize electrical hazards.
	03.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.
04.0	Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	04.01 Identify the kinds of information presented on Material Safety Data Sheets (MSDS).
	04.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).
05.0	Solve basic math problems common to water technologies. The student will be able to:
	05.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
	05.02 Identify metric measurements and perform conversions.
	05.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.
06.0	Define pumping and basic hydraulic principles. The student will be able to:
	06.01 Identify types of pumps.
	06.02 Discuss application and use of different types of pumps.
	06.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
	06.04 Identify types of pipes, valves, and fittings.
	06.05 Define cross connections.
	06.06 Identify the appropriate equipment used in the treatment processes.
07.0	Define principles of disinfection. The student will be able to:
	07.01 List the need/reasons for disinfection (list of waterborne diseases).
	07.02 Define concepts related to disinfection.
	07.03 List methods and chemicals used in disinfection.
	07.04 Define the physical properties of chlorine.

	07.05 List kinds of disinfection equipment used.
08.0	Define sampling techniques. The student will be able to:
	08.01 Define the reasons for sampling and types of samples.
	08.02 Define methods of sample collection and handling.
	08.03 Define the basic procedure for quality control and quality assurance in sampling.
	08.04 Define the chain of custody for samples.
	08.05 Perform total and free chlorine residual analysis.
	08.06 Perform pH analysis.
09.0	Define federal, state, and local regulations that apply to water technologies. The student will be able to:
	09.01 List regulatory agencies and their roles in monitoring the water technology field.
	09.02 Define regulations associated with the appropriate federal, state, or local agencies.
	09.03 Define training and certification requirements for water technology workers.
10.0	Demonstrate employability skills. The student will be able to:
	10.01 Conduct a job search.
	10.02 Secure information about a job.
	10.03 Develop a detailed and complete resume.
	10.04 Complete a job application.
	10.05 Demonstrate competence in job-interview techniques.
	10.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
	10.07 Identify acceptable work habits.
	10.08 Demonstrate knowledge of how to make job changes appropriately.
	10.09 Demonstrate acceptable employee-health habits for the treatment facility environment.
	10.10 Identify materials and documents needed for a professional library.

	10.11 Demonstrate productive and positive customer interactions.
	10.12 Demonstrate effective interpersonal communication skills.
11.0	Identify sampling techniques and explain the significance of the steps. The student will be able to:
	11.01 Identify the laboratory tests that are commonly performed by operators in Florida water-treatment facilities, including those required by the Safe Drinking Water Regulation.
	11.02 Define pathogenic organisms, including bacteria, protozoa, and virus, and describe their disease associations.
	11.03 Describe the laboratory test performed for the presence of bacteria.
	11.04 Describe the correct procedure for obtaining a bacteriological sample.
	11.05 Describe correct sample collection procedures for inorganic and organic analyses.
	11.06 Describe the laboratory quality-control checks and required documentation.
	11.07 Identify the chain of custody for a sample.
12.0	Identify chemical, biological, and physical constituents of water entering the water-treatment facility or distribution systems. The student will be able to:
	12.01 Determine which constituents are inherent to groundwater and/or surface water.
	12.02 Describe the relationship between turbidity and the microbiological quality of water.
	12.03 Describe the uses of chemical analysis in water-treatment operations.
	12.04 Identify symbols and common names for elements and chemical compounds.
	12.05 Select the primary constituents to be measured and the most commonly used units of measurement for each.
	12.06 Explain the importance of water treatment for the control of coliform bacteria and algae.
13.0	Describe the principles, operational and troubleshooting practices of the aeration process. The student will be able to:
	13.01 Describe the aeration and air stripping processes and explain how they differ.
	13.02 Identify the types of aeration systems.
	13.03 Identify the benefits of aeration.
	13.04 Describe the components of an air-stripping system.

	13.05 Troubleshoot aeration and air stripping processes.
14.0	Describe the principles, operational and troubleshooting practices of the mixing, coagulation, and flocculation processes. The student will be able to:
	14.01 Define concepts such as turbidity, color, coagulation, and flocculation.
	14.02 Define the difference between sweep and enhanced coagulation.
	14.03 Identify the kinds of equipment used in the coagulation process.
	14.04 Identify coagulant chemicals used in water-treatment facilities.
	14.05 Identify the steps of coagulation, in order.
	14.06 Identify the specific sampling locations for process control in a coagulation process.
	14.07 Identify factors that would contribute to poor floc formation.
	14.08 Compute the feed rate in pounds per day (lbs/d) when the chemical coagulant (mg/1) and flow rate (MGD) are known.
	14.09 Compute the dosage (mg/1) of coagulant when the rate of flow (MGD) and the feed rate (lbs/day) of the chemical coagulant are known.
	14.10 Compute the dosage rate that is needed to treat a different flow (MGD) at the current dosage when the current rate of flow (MGD) and the current coagulant feed rate (lbs/d) are known.
	14.11 Describe troubleshooting techniques for basic mixing, coagulation, and flocculation processes.
15.0	Describe the principles, operational and troubleshooting practices of the sedimentation process. The student will be able to:
	15.01 Describe an upflow clarifier and basin sedimentation.
	15.02 Identify factors that affect efficient sedimentation.
	15.03 Identify the measures that would be effective in preventing or controlling algae growth on surfaces of coagulation and sedimentation basins.
	15.04 Identify methods of sludge removal from sedimentation basins.
	15.05 Describe troubleshooting techniques for sedimentation and upflow clarifier processes.
16.0	Describe the principles, operational and troubleshooting practices of the filtration process. The student will be able to:
	16.01 Explain concepts related to filtration, including types of filters, filter-system components, and the steps for normal filtration operations.
	16.02 Explain common problems of filtering systems, including head loss, mudballs, and filter media loss.

	16.03 Determine when to backwash a filter.
	16.04 Identify the steps for backwashing a filter.
	16.05 Describe troubleshooting techniques for filtration processes.
17.0	Describe the principles, operational and troubleshooting practices of the water-softening process. The student will be able to:
	17.01 Describe the two types of hardness.
	17.02 Identify the appropriate chemical(s) to use in chemical-precipitation softening processes for the two kinds of hardness.
	17.03 Describe alkalinity and its components.
	17.04 Identify treatment processes used for water softening.
	17.05 Calculate the distribution of bicarbonate, carbonate, and/or hydroxide ions when given the total alkalinity and phenolphthalein alkalinity.
	17.06 Describe selective carbonate removal.
	17.07 Identify the important zones of an upflow clarifier unit.
	17.08 Describe the lime soda ash softening process, including its control.
	17.09 Compute lime demand from raw-water analyses.
	17.10 Describe the reasons for recarbonation.
	17.11 Compute carbon dioxide demands for recarbonation.
	17.12 Compute hardness removal when the ion-exchange capacity is known.
	17.13 Describe troubleshooting techniques for water-softening processes.
18.0	Describe the principles, operational and troubleshooting practices of the stabilization process. The student will be able to:
	18.01 Identify the chemicals used in stabilization.
	18.02 Identify two stabilization indices.
	18.03 Determine water stability, using the Langelier index, the marble test, and CCPP method.
	18.04 Troubleshoot stabilization processes.
19.0	Describe the principles, operational and troubleshooting practices of the corrosion control process. The student will be able to:

	19.01 Identify the factors that influence corrosion.
	19.02 Describe the problems that can be created by corrosive waters.
	19.03 Describe the basic concepts related to electrolysis.
	19.04 Define electrochemical reaction.
	19.05 Identify the chemicals used in corrosion control.
	19.06 Describe the conditions for calcium carbonate film formation.
	19.07 Define cathode film formation.
	19.08 Define cathodic protection and describe its application in water-treatment facilities.
	19.09 Describe troubleshooting techniques for corrosion-control processes.
20.0	Describe the principles, operational and troubleshooting practices of the disinfection process. The student will be able to:
	20.01 Identify the chemicals used in primary disinfection.
	20.02 Identify commonly used chlorinators and hypochlorinators.
	20.03 Determine the maximum amount of chlorine gas (in pounds) that may be taken from a cylinder in a 24-hour period.
	20.04 Identify proper maintenance procedures for equipment chlorination.
	20.05 Identify terminology related to chlorination and disinfection.
	20.06 Identify common safety problems or emergency situations that might occur during chlorination.
	20.07 Identify the properties of chlorine and describe its use in water treatment.
	20.08 Explain the points at which chlorine is applied most effectively in water treatment.
	20.09 Compute the feed rate (lbs/d) when given the rate of flow (MGD) and dosage of chlorine (mg/1).
	20.10 Compute the feed rate (lbs/d) of a hypochlorite compound that contains a given percentage of available chlorine when given a problem where the rate of flow (MGD) and the chlorine dosage (mg/1) are known.
	20.11 Compute the new rate of flow and the feed rate that will be needed to maintain the current dosage when given the current rate of flow (MGD), the current chlorine feed rate (lbs/d), and the amount by which the rate of flow is to be increased or decreased.
	20.12 Compute the feed rate needed to treat a given amount of water when given a chlorine demand and the desired chlorine residual.

	20.13 Describe troubleshooting techniques for disinfection processes.
21.0	Describe the principles, operational and troubleshooting practices for the control and treatment of trihalomethanes. The student will be able to:
	21.01 Describe the formation of total trihalomethanes (TTHM).
	21.02 Identify the specific procedure for collecting samples to determine trihalomethane levels.
	21.03 Compute the quarterly average and the annual TTHM measurements when sample results are given.
	21.04 Identify processes that remove trihalomethane precursors.
	21.05 Identify processes that remove trihalomethanes after they are formed.
	21.06 Identify the benefits of alternate disinfectants.
	21.07 Describe chloramination as a control of TTHM.
	21.08 Describe troubleshooting techniques for the control and treatment of trihalomethanes.
22.0	Describe the principles, operational and troubleshooting practices of the iron- and manganese-removal processes. The student will be able to:
	22.01 Explain the occurrence of iron and manganese in source water and in treated water.
	22.02 Describe the importance of controlling iron and manganese.
	22.03 Describe sample-collection and analysis procedures for iron and manganese.
	22.04 Describe remedial processes for controlling iron and manganese.
	22.05 Compute the potassium permanganate dosage for a known concentration of iron and manganese in the water being treated.
	22.06 Describe troubleshooting techniques for iron and manganese-removal processes.
23.0	Describe the principles, operational and troubleshooting practices for taste and odor control. The student will be able to:
	23.01 Identify common types of complaints about water quality.
	23.02 Identify causes of tastes and odors.
	23.03 Describe how microbial growths affect tastes and odors.
	23.04 Describe how eutrophication contributes to surface-water tastes and odors.

	23.05 Describe a cross-connection.
	23.06 Identify the chemicals used in the control and treatment of tastes and odors.
	23.07 Describe the Threshold Odor Number (TON) test.
	23.08 Determine the TON when dilution volumes and positive samples are given.
	23.09 Describe troubleshooting techniques for taste and odor control.
24.0	Describe the principles, operational and troubleshooting practices of the demineralization processes. The student will be able to:
	24.01 Define concepts related to demineralization, such as reverse osmosis (RO), flux, feedwater, permeate, and salinity.
	24.02 Describe the structure, composition, and performance of an RO membrane.
	24.03 Describe feedwater impurities, physical parameters, and conditions potentially harmful to the RO process.
	24.04 Identify items included in a typical RO-facility-operation checklist.
	24.05 Describe the common causes of membrane damage.
	24.06 Describe the procedure for membrane cleaning.
	24.07 Compute the percent of recovery when product flow and feed flow are known.
	24.08 Compute the percent of mineral rejection when total dissolved solids are known for the feedwater and product water.
	24.09 Describe the basic concepts of electrodialysis (ED), such as the cathode and anode relationship and the removal of typical inorganic salts.
	24.10 Describe the most common problem of ED operation in a facility.
	24.11 Explain how the cation membrane and the anion membrane differ.
	24.12 Describe the multi-compartment unit used in the ED process.
	24.13 Describe ED operating procedures in detail.
	24.14 Describe the two most common chemical solutions used to flush ED stack membranes.
25.0	Describe the principles, operational and troubleshooting practices of the fluoridation process. The student will be able to:
	25.01 Define the basic concepts related to fluoridation, including its purpose and the kinds of chemicals used.
	25.02 Identify the properties of fluoride and describe its use.

	25.03 Identify the types of equipment used in fluoridation.
	25.04 Describe proper maintenance procedures for fluoridation equipment.
	25.05 Describe potential safety problems or emergency situations in the fluoridation process, and ways to avoid them.
	25.06 Compute the feed rate of chemicals used in the fluoridation process.
	25.07 Describe troubleshooting techniques for the fluoridation processes.
26.0	Identify facility operational problems. The student will be able to:
	26.01 Respond to customer questions about taste or odor in the water.
	26.02 Respond to customer questions about red water or rust stains.
	26.03 Identify the probable cause(s) for a sudden change in chlorine demand; take corrective action.
27.0	Describe basic hydraulics and pumping operations. The student will be able to:
	27.01 Describe the relationship between the system head and pressure and make conversions between them.
	27.02 Describe three types of head, i.e., pressure, suction, and atmospheric.
	27.03 Describe proper operation of centrifugal and displacement pumps.
	27.04 Describe causes and solutions that are effective in preventing “water hammer “
	27.05 Describe causes and solutions that are effective in preventing cavitation.
	27.06 Troubleshoot pump operations.
28.0	Identify appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility. The student will be able to:
	28.01 Complete the Drinking Water Bacteriological Analysis Form correctly.
	28.02 Complete the DEP daily operation report (DOR) form correctly.
	28.03 Complete the DEP monthly operation report (MOR) form correctly.
	28.04 Identify the DEP requirements for the operation of standby and emergency equipment.
	28.05 Identify the DEP requirements for microbiological monitoring and analyses.
	28.06 Identify the DEP requirements for sampling and testing.

29.0	Perform equipment inspection, and identify basic maintenance for the treatment train, treatment residuals disposal, and solids management. The student will be able to:
29.01	Identify the appropriate equipment used in the treatment train, treatment residuals disposal, and solids management.
29.02	Describe a preliminary site inspection of the equipment used in the treatment train, treatment residuals disposal, and solids management.
29.03	Identify the maintenance needs of equipment used in the treatment train, treatment residuals disposal, and solids management, including safe procedures for maintenance.
29.04	Describe proper record keeping for preventive and corrective maintenance.
29.05	Describe preventive and corrective maintenance procedures for equipment used in the treatment process, treatment residuals disposal, and solids management

Course Number: EVS0143
Occupational Completion Point: B
Water Treatment Plant Operator B – 130 Hours

30.0	Analyze the constituents of water and select the appropriate treatment. The student will be able to:
30.01	Describe the water-treatment processes common in Florida.
30.02	Describe those processes that may reduce or control a contaminant for which maximum contaminant levels (MCL) exist.
31.0	Identify advanced sampling techniques and interpret the results. The student will be able to:
31.01	Demonstrate the need for chemical analyses in water treatment.
31.02	Select the appropriate treatment for a problem identified through laboratory testing.
31.03	Determine whether the finished water is acceptable or unacceptable according to laboratory results.
32.0	Solve algebra, ratio, and proportion problems in the water-treatment process. The student will be able to:
32.01	Perform advanced math problems including ratio and proportion.
32.02	Identify metric measurements and perform conversions.
32.03	Perform algebraic calculations essential to water treatment, when given values for components.
33.0	Demonstrate process optimization for water treatment. The student will be able to:
33.01	Describe the advanced principles and operational practices of sweep and enhanced coagulation and flocculation.

	33.02 Describe the advanced principles and operational practices of sedimentation.
	33.03 Describe the advanced principles and operational practices of disinfection.
	33.04 Describe the advanced principles and operational practices of filtration.
	33.05 Describe the advanced principles and operational practices of corrosion control.
	33.06 Describe the advanced principles and operational practices of taste and odor control.
	33.07 Describe the advanced principles and operational practices of iron and manganese control.
	33.08 Describe the advanced principles and operational practices of fluoridation.
	33.09 Describe the advanced principles and operational practices of softening.
	33.10 Describe the advanced principles and operational practices of demineralization.
	33.11 Describe the advanced principles, operational practices, and control of trihalomethanes and HAA5.
	33.12 Demonstrate process optimization for coagulation and flocculation.
	33.13 Demonstrate process optimization for sedimentation.
	33.14 Demonstrate process optimization for disinfection.
	33.15 Demonstrate process optimization for filtration.
	33.16 Demonstrate process optimization for corrosion control.
	33.17 Demonstrate process optimization for taste and odor control.
	33.18 Demonstrate process optimization for iron and manganese control.
	33.19 Demonstrate process optimization for fluoridation.
	33.20 Demonstrate process optimization for softening.
	33.21 Demonstrate process optimization for demineralization.
	33.22 Demonstrate process optimization for trihalomethanes and HAA5.
34.0	Analyze and correct facility operational problems. The student will be able to:
	34.01 Demonstrate troubleshooting techniques and corrective action for sweep and enhanced coagulation and flocculation.

	34.02 Demonstrate troubleshooting techniques and corrective action for sedimentation.
	34.03 Demonstrate troubleshooting techniques and corrective action for disinfection.
	34.04 Demonstrate troubleshooting techniques and corrective action for filtration.
	34.05 Demonstrate troubleshooting techniques and corrective action for corrosion control.
	34.06 Demonstrate troubleshooting techniques and corrective action for taste and odor control.
	34.07 Demonstrate troubleshooting techniques and corrective action for iron and manganese control.
	34.08 Demonstrate troubleshooting techniques and corrective action for fluoridation.
	34.09 Demonstrate troubleshooting techniques and corrective action for softening.
	34.10 Demonstrate troubleshooting techniques and corrective action for demineralization.
	34.11 Demonstrate troubleshooting techniques and corrective action for trihalomethanes and HAA5.
35.0	Demonstrate equipment inspection and preventive maintenance procedures. The student will be able to:
	35.01 Identify the components of a preventive maintenance plan.
	35.02 Use trend analysis in preventive maintenance.
	35.03 Perform a site inspection.
	35.04 Develop a training plan (for a new employee) for inspection of equipment.
36.0	Apply appropriate federal, state, and local regulations for the operation and maintenance of a public potable-water facility. The student will be able to:
	36.01 Explain the regulations in Chapter 62-602, F.A.C., covering duties, responsibilities, certification requirements, testing, renewal, staffing, and facility classification.
	36.02 Explain the regulations in Chapter 62-550, F.A.C., concerning samples and analyses at water-treatment facilities.
	36.03 Explain the regulations in Chapter 62-555, F.A.C., concerning the construction and maintenance of water plants.
	36.04 Explain DEP regulations that apply to procedures such as reclaiming water and managing residuals.
	36.05 Apply regulations concerning facility management.
	36.06 Apply regulations concerning samples and analyses.

	36.07 Apply regulations concerning laboratory management.
37.0	Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	37.01 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
	37.02 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.
38.0	Describe energy conservation and identify ways to conserve energy in the water-treatment facility. The student will be able to:
	38.01 Identify the causes of energy loss.
	38.02 Rank various pieces of equipment in order of energy consumption.
	38.03 Describe procedures for performing an energy survey.
	38.04 Describe methods to conserve energy, such as equipment and process adjustments.
39.0	Demonstrate supervisory skills. The student will be able to:
	39.01 Identify supervisory skills and various leadership styles.
	39.02 Delegate responsibility and assign tasks to employees.
	39.03 Follow the proper procedure for handling employee grievances.
	39.04 Follow the proper procedure for disciplining employees.
	39.05 Follow staffing guidelines in planning.
	39.06 Conduct an orientation of a new employee and follow the training program.
	39.07 Evaluate employees objectively.
	39.08 Identify emergency situations and respond appropriately.
	39.09 Identify the components of the budgeting process.
	39.10 Demonstrate inventory-control procedures.
	39.11 Explain the importance of ethics in supervision.
	39.12 Identify the role of the supervisor in a facility safety program.
	39.13 Identify the role of the supervisor in customer relations.

Course Number: EVS0153 Occupational Completion Point: C Water Treatment Plant Operator A – 120 Hours	
40.0	Describe theoretical facility-management skills. The student will be able to:
	40.01 Describe the principles of management and supervision.
	40.02 Describe concepts related to management and supervision.
41.0	Demonstrate methods of organization and control. The student will be able to:
	41.01 Demonstrate organizational methods.
	41.02 Develop an organizational chart.
	41.03 Develop a staffing pattern.
	41.04 Identify formal and informal lines of communication.
42.0	Develop a plan for cost management. The student will be able to:
	42.01 Identify the costs of operation, such as personnel, inventory, operations, energy consumption, and equipment maintenance.
	42.02 Perform cost surveys.
	42.03 Develop a plan for efficient operations.
	42.04 Explain system-efficiency balance.
43.0	Prepare budgets and personnel assignments. The student will be able to:
	43.01 Identify budget activities and categories of expense accounts related to water- or wastewater-treatment facilities.
	43.02 Identify techniques of budget control.
	43.03 Prepare a budget, including long-range projections.
	43.04 Prepare a staffing schedule, including the appropriate levels of staff for all required shifts.
44.0	Develop standard operating procedures for the training and orientation of new employees. The student will be able to:
	44.01 Develop a written plan for an in-house orientation program for new employees.

	44.02 Identify information that a supervisor should give new employees, including leave procedures, insurance procedures, safety procedures, chain of command, etc.
	44.03 Develop a written plan for an in-house training program that includes safety measures and hazardous or toxic materials in the workplace.
	44.04 Develop a written plan for a cross-training program in facility operations.
45.0	Demonstrate personnel selection and discipline. The student will be able to:
	45.01 Identify appropriate interviewing and hiring practices.
	45.02 Develop a job description and identify the essential functions of the job.
	45.03 Identify control factors that are important in an organizational plan and that set limits on delegated authority.
	45.04 Identify appropriate actions of the supervisor, the employee, etc., in a grievance procedure.
	45.05 Identify characteristics important to the role of a supervisor.
	45.06 Determine requirements for a new position.
	45.07 Advertise for the position, including the job description, job responsibilities, education requirements, and job conditions.
	45.08 Analyze job applications to select qualified candidates to interview.
	45.09 Conduct interviews.
	45.10 Notify interviewees of the results, and conduct follow-up activities.
	45.11 Use appropriate human-relations and communication skills.
	45.12 Train, evaluate, and discipline employees objectively.
	45.13 Identify appropriate actions of a supervisor in evaluating personnel performance.
46.0	Demonstrate contingency planning. The student will be able to:
	46.01 Analyze potential emergency situations that can occur in a facility.
	46.02 Develop a plan for handling problems caused by emergency situations, including what equipment would be used and what sampling would be needed.
	46.03 Develop procedures for responding to customer complaints.
	46.04 Develop procedures to ensure employee safety.

	46.05 Develop procedures to ensure continuous operations, including preventive maintenance, alternative procedures, etc.
47.0	Develop a plan for energy conservation. The student will be able to:
	47.01 Describe concepts related to energy conservation.
	47.02 Identify energy-conservation measures.
48.0	Describe record-keeping and use of computer applications in planning. The student will be able to:
	48.01 Develop a plan for inventory control.
	48.02 Develop a plan for an analysis of operation and maintenance (O&M) logs and for the optimum operation of equipment.
	48.03 Identify the various types of facility automation.
	48.04 Review available hardware and software, based on record-keeping needs.
49.0	Describe process optimization for water or wastewater treatment facilities. The student will be able to:
	49.01 Develop a plan for process control to achieve efficient, energy-saving, cost-effective operation.
	49.02 Develop a plan for testing and analyzing the treatment operations for use in long-range facility operations.
	49.03 Develop a plan for the systematic troubleshooting of operational problems.
	49.04 Develop a plan for documenting operations and problems in order to anticipate and avoid potential problems.
50.0	Interpret permits and blueprints. The student will be able to:
	50.01 Read and interpret blueprints for water and wastewater facilities.
	50.02 Read the facility construction and operating permits and relate permit requirements to facility operations.
51.0	Develop a laboratory plan for process control. The student will be able to:
	51.01 Identify laboratory equipment for process control.
	51.02 Develop a plan for equipment calibration and maintenance.
	51.03 Develop a laboratory-staffing plan.
	51.04 Determine whether in-house laboratory operations are cost-effective.
	51.05 Review procedures for quality assurance/quality control in a facility laboratory.

	51.06 Review procedures for obtaining certification for a facility laboratory.
	51.07 Develop a sampling/analysis schedule for effective process control.
52.0	Employ public-relations skills in community interactions. The student will be able to:
	52.01 Plan facility tours for the public.
	52.02 Demonstrate how to handle press and public inquiries appropriately.
	52.03 Demonstrate how to inform the public if a potential emergency situation arises.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Program Title: **Wastewater Treatment Technologies**
Program Type: **Career Preparatory**
Career Cluster: **Agriculture, Food and Natural Resources**

Career Certificate Program	
Program Number	P150527
CIP Number	0715050604
Grade Level	30, 31
Program Length	405 hours
Teacher Certification	Refer to the **Program Structure** section.
CTSO	N/A
SOC Codes (all applicable)	Please see the CIP to SOC Crosswalk located at the link below.
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml
Basic Skills Level	N/A

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the career Agriculture, Food and Natural Resources cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Wastewater Treatment sector of the Agriculture, Food and Natural Resources career cluster.

The content includes but is not limited to source water or influent characteristics; treatment facility unit processes and operational techniques; water quality and identification; identifying treatment goals and measuring their achievement; disinfection; process control techniques; sampling, testing, and laboratory analysis; supervision; operation maintenance and inspection of facility equipment; application of current DEP regulations and standards; facility administration and management techniques; and troubleshooting operational control problems. The emphasis is on skills that are needed for effective treatment process control and troubleshooting.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length
A	EVS0333	Wastewater Treatment Plant Operator C	WSP OPER 7G	155 hours
B	EVS0343	Wastewater Treatment Plant Operator B		130 hours
C	EVS0350	Wastewater Treatment Plant Operator A		120 hours

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.

2. Apply appropriate academic and technical skills.

3. Attend to personal health and financial well-being.

4. Communicate clearly, effectively and with reason.

5. Consider the environmental, social and economic impacts of decisions.

6. Demonstrate creativity and innovation.

7. Employ valid and reliable research strategies.

8. Utilize critical thinking to make sense of problems and persevere in solving them.

9. Model integrity, ethical leadership and effective management.

10. Plan education and career path aligned to personal goals.

11. Use technology to enhance productivity.

12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Wastewater Treatment Plant Operator C

01.0 Identify professions related to the water technology field.
02.0 Identify scientific concepts common in water and wastewater treatment.
03.0 Identify safety hazards associated with water technologies.
04.0 Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
05.0 Solve basic math problems common to water technologies.
06.0 Define pumping and basic hydraulic principles.
07.0 Define principles of disinfection.
08.0 Define sampling techniques.
09.0 Define federal, state, and local regulations that apply to water technologies.
10.0 Demonstrate employability skills.
11.0 Identify the basic characteristics and principles of wastewater treatment.
12.0 Identify sampling techniques and interpret the results.
13.0 Describe the sources of wastewater and the types of collection systems.
14.0 Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management.
15.0 Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management.
16.0 Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management.
17.0 Identify and correct facility operational problems.
18.0 Identify federal, state, and local regulations governing wastewater technologies.
19.0 Describe federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.

Wastewater Treatment Plant Operator B

20.0 Identify the constituents of influent and its effects on the treatment process.
21.0 Identify the constituents of wastewater and select the appropriate treatment.
22.0 Demonstrate advanced sampling techniques and interpret results.
23.0 Describe process optimization for preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal, and solids management.
24.0 Describe advanced treatment process control for the treatment train, effluent disposal, and solids management.
25.0 Describe advanced equipment inspection and preventive maintenance for the treatment train, effluent disposal, and solids management.
26.0 Describe and correct facility operational problems.
27.0 Apply federal, state, and local regulations governing wastewater technologies.
28.0 Apply federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials.
29.0 Describe energy conservation and identify ways to conserve energy in the wastewater treatment facility.
30.0 Demonstrate supervisory skills.

Wastewater Treatment Plant Operator A

31.0 Discuss facility management skills.
32.0 Demonstrate methods of organization and control.
33.0 Develop a plan for cost management.
34.0 Prepare budgets and personnel assignments.
35.0 Develop standard operating procedures for the training and orientation of new employees.
36.0 Demonstrate personnel selection and discipline.
37.0 Demonstrate contingency planning.
38.0 Develop a plan for energy conservation.
39.0 Demonstrate record keeping and use of computer applications in planning.
40.0 Demonstrate process optimization for water or wastewater treatment facilities.
41.0 Interpret permits and blueprints.
42.0 Develop a laboratory plan for process control.
43.0 Employ public-relations skills in community interactions.

Florida Department of Education
Student Performance Standards

Program Title: **Wastewater Treatment Technologies**
Career Certificate Program Number: **P150527**

Course Number: EVS0333 **Occupational Completion Point: A** **Wastewater Treatment Plant Operator C – 155 Hours**	
01.0	Identify professions related to the water technology field. The student will be able to:
01.01	List duties of water technology workers such as wastewater operator, water operator, systems operator, stormwater operator, residual (bio-solids) hauler operator, cross connection operator, pretreatment operator, and meter reading/maintenance operator.
01.02	Identify the basic terms and concepts involved in processes used in these professions.
01.03	List potential employers in the water technology field: federal, municipal, county, state and private.
01.04	Identify resources to assist in finding employment in the field.
01.05	Identify professional organizations related to the water technology field.
01.06	Identify career ladder levels in the water technology field: trainee, C Level, B Level, A Level.
02.0	Identify scientific concepts common in water and wastewater treatment. The student will be able to:
02.01	Identify chemical symbols used in water and wastewater treatment.
02.02	Describe the hydrologic cycle.
02.03	Describe the basic concepts of the pH scale and its importance in the treatment process.
02.04	Identify the differences between mixtures, elements, and compounds, and organic and inorganic chemicals.
02.05	Identify principle states of matter: liquid, solid, and gas.
02.06	Identify the basic nitrogen, phosphorous, and carbon cycles.
03.0	Identify safety hazards associated with water technologies. The student will be able to:
03.01	Identify the types of hazards common to water technology facilities.
03.02	Recognize unsafe conditions and prescribe corrective measures.

	03.03 Identify and safely handle hazardous chemicals common to water technology facilities.
	03.04 Recognize electrical hazards.
	03.05 Recognize fire hazards, identify types of fires, and describe appropriate extinguishing techniques.
04.0	Identify federal, state, and local regulations for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	04.01 Identify the kinds of information presented on Material Safety Data Sheets (MSDS).
	04.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (chapter 442, F.S.).
05.0	Solve basic math problems common to water technologies. The student will be able to:
	05.01 Perform basic arithmetic problems, including addition, subtraction, multiplication, division, fractions, decimals, percentages, rounding (significant figures), graphing, etc.
	05.02 Identify metric measurements and perform conversions.
	05.03 Perform calculations that involve areas, volumes, capacities, retention times, pounds, mg/L, velocities, flow rates, pressure, and head.
06.0	Define pumping and basic hydraulic principles. The student will be able to:
	06.01 Identify types of pumps.
	06.02 Discuss application and use of different types of pumps.
	06.03 Identify components/characteristics of pumps including pump operation and basic pump curves including centrifugal pumps, positive displacement pumps, and air lift pumps.
	06.04 Identify types of pipes, valves, and fittings.
	06.05 Define cross connections.
	06.06 Identify the appropriate equipment used in the treatment processes.
07.0	Define principles of disinfection. The student will be able to:
	07.01 List the need/reasons for disinfection (list of waterborne diseases).
	07.02 Define concepts related to disinfection.
	07.03 List methods and chemicals used in disinfection.
	07.04 Define the physical properties of chlorine.

	07.05 List kinds of disinfection equipment used.
08.0	Define sampling techniques. The student will be able to:
	08.01 Define the reasons for sampling and types of samples.
	08.02 Define methods of sample collection and handling.
	08.03 Define the basic procedure for quality control and quality assurance in sampling.
	08.04 Define the chain of custody for samples.
	08.05 Perform chlorine residual analysis.
	08.06 Perform pH analysis.
09.0	Define federal, state, and local regulations that apply to water technologies. The student will be able to:
	09.01 List regulatory agencies and their roles in monitoring the water technology field.
	09.02 Define regulations associated with the appropriate federal, state, or local agencies.
	09.03 Define training and certification requirements for water technology workers.
10.0	Demonstrate employability skills. The student will be able to:
	10.01 Conduct a job search.
	10.02 Secure information about a job.
	10.03 Identify documents that may be required for a job application.
	10.04 Complete a job application.
	10.05 Demonstrate competence in job-interview techniques.
	10.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
	10.07 Identify acceptable work habits.
	10.08 Demonstrate knowledge of how to make job changes appropriately.
	10.09 Demonstrate acceptable employee-health habits for the treatment facility environment.
	10.10 Identify materials and documents needed for a professional library.

	10.11 Demonstrate productive and positive customer interactions.
	10.12 Demonstrate effective interpersonal communication skills.
11.0	Identify the basic characteristics and principles of wastewater treatment. The student will be able to:
	11.01 Identify the sources of wastewater and the objectives of wastewater treatment.
	11.02 Identify terms used in wastewater treatment.
	11.03 Identify the impact of wastewater on receiving bodies of water.
	11.04 Identify biological organisms present in treatment processes.
	11.05 Identify waterborne diseases.
	11.06 Identify commonly measured wastewater parameters.
	11.07 Identify factors affecting raw wastewater.
	11.08 Correlate treatment processes to types of facility influent and solids.
12.0	Identify sampling techniques and interpret the results. The student will be able to:
	12.01 Identify the reasons for sampling and the types of samples (e.g., simple, representative, grab, composite).
	12.02 Describe methods of sample collection and handling.
	12.03 Identify specific samples (biological or chemical) and determine the significance of sample results required for process quality control, for compliance with standards, and for reporting.
	12.04 Identify representative sampling points.
	12.05 Identify the significance of the flow measurement on process control.
13.0	Describe the sources of wastewater and the types of collection systems. The student will be able to:
	13.01 Describe the types of wastewater collection systems.
	13.02 Identify flow variations and conditions that affect plant treatment, including infiltration, inflow, and lift stations.
	13.03 Identify methods to detect and correct infiltration.
	13.04 Identify dissolved gases in wastewater and the effect of their presence/absence on treatment.
14.0	Describe the process and the operational principles for the preliminary, primary, secondary, and tertiary treatment (the treatment train);

	effluent disposal; and solids management. The student will be able to:
	14.01 Describe concepts related to preliminary and primary treatment.
	14.02 Describe the types of preliminary treatment equipment, the way they function, and the relationship of each to the treatment train.
	14.03 Describe the types of primary treatment equipment, the way they function, and the relationship of each to the treatment train.
	14.04 Describe concepts related to secondary treatment, including attached growth processes, suspended growth processes, aeration, and clarification.
	14.05 Describe the types of secondary treatment equipment, the way they function, and the relationship of each to the treatment train.
	14.06 Describe concepts related to tertiary treatment processes, including sand filtration, nitrification/denitrification, oxic/anoxic, activated carbon, and artificial wetlands.
	14.07 Describe the types of tertiary treatment equipment, the way they function, and the relationship of each to the treatment train.
	14.08 Describe concepts related to disinfection and effluent disposal, including surface water, reuse reclamation, deep well, and ocean outfall.
	14.09 Describe the types of disinfection and the types of effluent-disposal equipment, the way they function, and the relationship of each to the system.
	14.10 Describe concepts related to solids management, including thickening, aerobic and anaerobic digestion, stabilization, de-watering, and reuse.
	14.11 Describe the types of solids-management equipment, the way they function, and the relationship of each to the system.
15.0	Perform treatment-process control and troubleshooting for the treatment train, effluent disposal, and solids management. The student will be able to:
	15.01 Describe the grit-removal process and the operational efficiency of each step.
	15.02 Describe the laboratory tests performed on influent.
	15.03 Describe the primary-clarifier removal efficiencies, including settleable solids, suspended solids, total solids, BOD, and bacteria.
	15.04 Describe sampling points, frequency of sampling, and the laboratory tests and results that are used for the proper operation of the primary clarifier.
	15.05 Select and plot on a trend chart the parameters for primary clarification.
	15.06 Use the operational data required to evaluate the performance of secondary-treatment processes, including attached growth, suspended growth, aeration, and clarification.
	15.07 Describe sampling points, the frequency of sampling, and the laboratory tests and results used for proper operation of the secondary-treatment processes.
	15.08 Select and plot on a trend chart the parameters for secondary clarification.

15.09	Describe how nitrification affects secondary processes and clarification.
15.10	Describe how denitrification affects secondary processes and clarification.
15.11	Use operational data to evaluate the performance of sand filtration.
15.12	Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of sand filtration. Select and plot on a trend chart the parameters for sand filtration.
15.13	Use operational data to evaluate the nitrification/denitrification process.
15.14	Use operational data to evaluate the performance of effluent-disposal processes, including disinfection and dechlorination.
15.15	Describe sampling points, the frequency of sampling, and the laboratory tests used for checking the proper operation of effluent disposal.
15.16	Select and plot on a trend chart the parameters for effluent disposal.
15.17	Describe various methods of effluent disinfection including UV, chlorination, and ozonation.
15.18	Describe the chemical and physical properties of chlorine, and describe the reactions of chlorine with water, ammonia compounds, and sulfides.
15.19	Describe the safe storage and handling of chlorine, including the use of testing compounds.
15.20	Explain the points of application of chlorine in wastewater treatment.
15.21	Describe the methods of dechlorination.
15.22	Describe the methods commonly used to dispose of wastewater effluents, including reuse applications.
15.23	Describe the laboratory tests commonly used on the reuse of effluent.
15.24	Describe the types of sludge and their characteristics.
15.25	Use operational data to evaluate the performance of solids management, including sludge thickening, digestion, de-watering, and disposal processes.
15.26	Describe sampling points, the frequency of sampling, and the laboratory tests and results used for checking the proper operation of solids management and for compliance with Chapter 62-640, F.A.C.
16.0	Perform equipment inspection, and identify basic maintenance for the treatment train, effluent disposal, and solids management. The student will be able to:
16.01	Identify the appropriate equipment used in the treatment train, effluent disposal, and solids management.
16.02	Describe a preliminary site inspection of the equipment used in the treatment train, effluent disposal, and solids management.
16.03	Identify the maintenance needs of equipment used in the treatment train, effluent disposal, and solids management, including safe procedures for maintenance.

	16.04 Describe proper record keeping for preventive and corrective maintenance.
	16.05 Describe preventive and corrective maintenance procedures for equipment used in the treatment process, effluent disposal, and solids management.
17.0	Identify and correct facility operational problems. The student will be able to:
	17.01 Describe common facility operational problems in the treatment train, effluent disposal, and solids management.
	17.02 Describe methods to evaluate operational problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
	17.03 Select appropriate corrective actions for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
	17.04 Describe the methods for monitoring results of corrective action taken for common problems in preliminary, primary, secondary, and tertiary treatment, effluent disposal, and solids management.
18.0	Identify appropriate federal, state, and local regulations. The student will be able to:
	18.01 Identify federal, state and local regulations that apply to the operation of a wastewater-treatment facility.
	18.02 Describe the operator's duties and responsibilities, certification requirements, testing, renewal, staffing, and facility classification (sections of Chapter 62-602, F.A.C.).
	18.03 Explain and describe the contents of an operating permit.
	18.04 Identify state regulations that apply to procedures such as reclaimed water, reuse, and residuals management.
19.0	Describe federal, state, and local laws for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	19.01 Identify the kinds of information presented on the MSDS.
	19.02 Describe requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).
	19.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
	19.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.

Course Number: EVS0343 **Occupational Completion Point: B** **Wastewater Treatment Plant Operator B – 130 Hours**	
20.0	Identify the constituents of influent and its effects on the treatment process. The student will be able to:
	20.01 Explain the significance of dissolved gases in the influent and the effects of dissolved gases on treatments.

	20.02 Explain the sources of infiltration and inflow and discuss the effects of infiltration and inflow on treatment processes.
	20.03 Explain the effect of lift-station performance on the overall treatment process.
	20.04 Describe solutions for lift-station problems, such as surging flows, septic conditions, and power outages.
21.0	Identify the constituents of wastewater and select the appropriate treatment. The student will be able to:
	21.01 Identify the specific physical, chemical, and biological characteristics of wastewater.
	21.02 Describe respiration, gas production, aerobic and anaerobic conditions, different methods of effluent disposal, and solids management.
	21.03 Identify levels of wastewater treatment and limits on facility discharges.
22.0	Demonstrate advanced sampling techniques and interpret the results. The student will be able to:
	22.01 Develop standard operating procedures for taking samples for process quality control, for compliance with standards, and for reporting requirements.
	22.02 Identify microorganisms present in wastewater and discuss the significance of changes in their populations.
	22.03 Demonstrate laboratory quality-control/quality-assurance procedures and required documentation.
	22.04 Demonstrate the reasons for measuring the flows of treated and untreated wastewater, and the effects of those flows on process control.
23.0	Describe process optimization for preliminary, primary, secondary, and tertiary treatment (the treatment train); effluent disposal; and solids management. The student will be able to:
	23.01 Interpret laboratory data commonly obtained on incoming wastewater to monitor the efficiency of the selected treatment.
	23.02 Describe possible adjustments to achieve process optimization for handling influent.
	23.03 Interpret laboratory data commonly obtained on wastewater during primary treatment to monitor the efficiency of the selected treatment.
	23.04 Describe possible adjustments to achieve process optimization for handling primary treatment.
	23.05 Interpret laboratory data commonly obtained on wastewater during secondary treatment to monitor the efficiency of the selected treatment.
	23.06 Describe possible adjustments to achieve process optimization for secondary treatment.
	23.07 Interpret laboratory data commonly obtained on wastewater during tertiary treatment to monitor the efficiency of the selected treatment.
	23.08 Describe possible adjustments to achieve process optimization for tertiary treatment.
	23.09 Interpret laboratory data commonly obtained on reclaimed water during disinfection and disposal to monitor the efficiency of the

	selected treatment.
23.10	Describe possible adjustments to achieve process optimization for disinfection and disposal processes.
23.11	Interpret laboratory data commonly obtained during solids management, including solids-content tests, to monitor the efficiency of the selected treatment.
23.12	Describe possible adjustments to achieve process optimization in solids management.
23.13	Describe options for solids disposal, based on the analysis of constituents, including all accountability records, and the costs.
24.0	Describe advanced treatment process control for the treatment train, effluent disposal, and solids management. The student will be able to:
24.01	Describe concepts related to advanced laboratory tests taken in the secondary-treatment processes.
24.02	Describe concepts related to advanced laboratory tests taken in advanced or tertiary treatment.
24.03	Describe concepts related to advanced laboratory tests for disinfection, effluent disposal, and solids management.
25.0	Describe advanced equipment inspection and preventive maintenance for the treatment train, effluent disposal, and solids management. The student will be able to:
25.01	Describe a preventive maintenance plan for a specific piece of equipment and/or unit process.
25.02	Describe trends analysis used in preventive maintenance planning.
25.03	Describe the monitoring of facility equipment operation and usage with remote sensing equipment.
26.0	Describe and correct facility operational problems. The student will be able to:
26.01	Describe troubleshooting techniques to locate operational problems.
26.02	Select appropriate corrective actions for advanced operational problems.
26.03	Describe advanced methods of monitoring results of corrective actions taken.
26.04	Describe actions that should be taken to prevent recurrence of identified advanced operational problems.
27.0	Apply federal, state, and local regulations governing wastewater technologies. The student will be able to:
27.01	Describe supervisory tasks related to duties, responsibilities, certification requirements, testing, renewal, staffing, and facility classification (Chapter 62-602, F.A.C.).
27.02	Apply rules concerning samples and analyses at wastewater-treatment facilities (Chapter 62-601, F.A.C.).
27.03	Complete the DEP monthly operating report (MOR) Form correctly.

	27.04 Complete a National Pollution Discharge Elimination System (NPDES) MOR form.
	27.05 Follow DEP rules that apply to procedures such as reclaiming and reusing water and managing residuals.
	27.06 Follow federal rules that apply to the operation of a wastewater-treatment facility.
28.0	Apply federal, state, and local laws for the handling, storage, and use of toxic and hazardous materials. The student will be able to:
	28.01 Identify the kinds of information presented on the MSDS.
	28.02 Demonstrate requirements for in-plant training and the accessibility of information on hazardous and toxic substances (Chapter 442, F.S.).
	28.03 Identify the reporting requirements as specified in SARA Title III and Chapter 252, F.S.
	28.04 Describe the responsibilities toward the community as specified in SARA Title III and Chapter 252, F.S.
29.0	Describe energy conservation and demonstrate ways to conserve energy in the wastewater-treatment facility. The student will be able to:
	29.01 Identify the causes of energy loss.
	29.02 Rank various pieces of equipment in order of energy consumption.
	29.03 Demonstrate procedures for performing an energy survey.
	29.04 Demonstrate methods to conserve energy, such as equipment and process adjustments.
30.0	Demonstrate supervisory skills. The student will be able to:
	30.01 Identify supervisory skills and various leadership styles.
	30.02 Delegate responsibility and assign tasks to employees.
	30.03 Follow the proper procedure for handling employee grievances.
	30.04 Follow the proper procedure for disciplining employees.
	30.05 Follow staffing guidelines in planning.
	30.06 Conduct an orientation of a new employee and follow the training program.
	30.07 Evaluate employees objectively.
	30.08 Identify emergency situations and respond appropriately.
	30.09 Identify the components of the budgeting process.

	30.10 Demonstrate inventory control procedures.
	30.11 Explain the importance of ethics in supervision.
	30.12 Identify the role of the supervisor in a facility safety program.
	30.13 Identify the role of the supervisor in customer relations

Course Number: EVS0350 Occupational Completion Point: C Wastewater Treatment Plant Operator A – 120 Hours	
31.0	Discuss facility-management skills. The student will be able to:
	31.01 Describe the principles of management and supervision.
	31.02 Describe concepts related to management and supervision.
32.0	Demonstrate methods of organization and control. The student will be able to:
	32.01 Demonstrate organizational methods.
	32.02 Develop an organizational chart.
	32.03 Develop a staffing pattern.
	32.04 Identify formal and informal lines of communication.
33.0	Develop a plan for cost management. The student will be able to:
	33.01 Identify the costs of operation such as personnel, inventory, operations, energy consumption, and equipment maintenance.
	33.02 Perform cost surveys.
	33.03 Develop a plan for efficient operations.
	33.04 Explain system-efficiency balance.
34.0	Prepare budgets and personnel assignments. The student will be able to:
	34.01 Identify budget activities and categories of expense accounts related to water- or wastewater-treatment facilities.
	34.02 Identify techniques of budget control.

	34.03 Prepare a budget, including long-range projections.
	34.04 Prepare a staffing schedule, including the appropriate levels of staff for all required shifts.
35.0	Develop standard operating procedures for the training and orientation of new employees. The student will be able to:
	35.01 Develop a written plan for an in-house orientation program for new employees.
	35.02 Identify information that a supervisor should give new employees, including leave procedures, insurance procedures, safety procedures, chain of command, etc.
	35.03 Develop a written plan for an in-house training program that includes safety measures and hazardous or toxic materials in the workplace.
	35.04 Develop a written plan for a cross-training program in facility operations.
36.0	Demonstrate personnel selection and discipline. The student will be able to:
	36.01 Identify appropriate interviewing and hiring practices.
	36.02 Develop a job description.
	36.03 Identify control factors that are important in an organizational plan and that set limits on delegated authority.
	36.04 Identify appropriate actions of the supervisor, the employee, etc., in a grievance procedure.
	36.05 Identify characteristics important to the role of a supervisor.
	36.06 Determine requirements for a new position.
	36.07 Advertise for the position, including the job description, job responsibilities, education requirements, and job conditions.
	36.08 Analyze job applications to select qualified candidates to interview.
	36.09 Conduct interviews.
	36.10 Notify interviewees of the results, and conduct follow-up activities.
	36.11 Use appropriate human-relations and communication skills.
	36.12 Train, evaluate, and discipline employees objectively.
	36.13 Identify appropriate actions of a supervisor in evaluating personnel performance.
37.0	Demonstrate contingency planning. The student will be able to:

	37.01 Analyze potential emergency situations that can occur in a facility.
	37.02 Develop a plan for handling problems caused by emergency situations, including what equipment would be used and what sampling would be needed.
	37.03 Develop procedures for responding to customer complaints.
	37.04 Develop procedures to ensure employee safety.
	37.05 Develop procedures to ensure continuous operations, including preventive maintenance, alternative procedures, etc.
38.0	Develop a plan for energy conservation. The student will be able to:
	38.01 Describe concepts related to energy conservation.
	38.02 Identify energy-conservation measures.
39.0	Demonstrate record-keeping and use of computer applications in planning. The student will be able to:
	39.01 Develop a plan for inventory control.
	39.02 Develop a plan for an analysis of operation and maintenance (O & M) logs and for the optimum operation of equipment.
	39.03 Identify the various types of facility automation.
	39.04 Review available hardware and software, based on record-keeping needs.
40.0	Demonstrate process optimization for water or wastewater treatment facilities. The student will be able to:
	40.01 Develop a plan for process control to achieve efficient, energy-saving, cost-effective operation.
	40.02 Develop a plan for testing and analyzing the treatment operations for use in long-range facility operations.
	40.03 Develop a plan for the systematic troubleshooting of operational problems.
	40.04 Develop a plan for documenting operations and problems in order to anticipate and avoid potential problems.
41.0	Interpret permits and blueprints. The student will be able to:
	41.01 Read and interpret blueprints for water and wastewater facilities.
	41.02 Read the facility construction and operating permits and relate permit requirements to facility operations.
42.0	Develop a laboratory plan for process control. The student will be able to:
	42.01 Identify laboratory equipment for process control.

	42.02 Develop a plan for equipment calibration and maintenance.
	42.03 Develop a laboratory-staffing plan.
	42.04 Determine whether in-house laboratory operations are cost-effective.
	42.05 Review procedures for quality assurance/quality control in a facility laboratory.
	42.06 Review procedures for obtaining certification for a facility laboratory.
	42.07 Develop a sampling/analysis schedule for effective process control.
43.0	Employ public-relations skills in community interactions. The student will be able to:
	43.01 Plan facility tours for the public.
	43.02 Demonstrate how to handle press and public inquiries appropriately.
	43.03 Demonstrate how to inform the public if a potential emergency situation arises.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Florida Department of Education
Curriculum Framework

Program Title: **Precision Agriculture Technology**
Career Cluster: **Agriculture, Food and Natural Resources**

AS	
CIP Number	1101000001
Program Type	College Credit
Program Length	60 credit hours
CTSO	FFA
SOC Codes (all applicable)	Please see the Master Credential List for this program's assigned SOC codes. https://careersourceflorida.com/boardroom/florida-credentials-review-committee-draft/master-credentials-list/
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

The content includes but is not limited to the principles and practices of precision agriculture, including geospatial technologies; data collection and analysis; and the operation and maintenance of advanced agricultural equipment. Students will gain proficiency in soil and water management, integrated pest and nutrient management, and sustainable agricultural practices, ensuring environmentally responsible and economically viable operations. The program emphasizes the application of emerging technologies such as robotics, IoT, and artificial intelligence, alongside the development of critical thinking, problem-solving, and communication skills. Graduates will be prepared to address complex agricultural challenges, comply with industry regulations, and adapt to global trends in agriculture, positioning them for successful careers in the Agriculture, Food, and Natural Resources sector or for further academic study.

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Agriculture, Food and Natural Resources career cluster; provides technical skill proficiency; and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Agriculture, Food and Natural Resources career cluster.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of 60 credit hours.

When developing the course sequence for the local implementation of this program, select courses that:

- Meet the skill development requirements of the standards and benchmarks of this program.
- Meet the general education core course requirements of Rule 6A-14.0303, Florida Administrative Code.
- Where reasonable and practicable, align with programs offered by your institution or other postsecondary institutions in Florida, including:
    - Related CCC and ATD credentials.
    - Baccalaureate degrees within the same career pathway and/or Federal CIP code.

Visit FloridaShines' Discover Programs website to identify other institutions that offer similar programs to review their course sequencing. Where appropriate, course alignment between institutions offering related programs can facilitate interagency student articulation.

Visit FloridaShines' Common Prerequisites Manual to identify courses that are prerequisites for admission into an upper division program. When sub-baccalaureate courses are aligned to the course admissions requirements of baccalaureate programs with the same career pathway, students can enter upper division coursework seamlessly.

Standards

After successfully completing this program, the student will have demonstrated mastery the following student learning outcomes:

01.0 Explain the principles of precision agriculture.
02.0 Utilize geospatial technologies in agricultural applications.
03.0 Operate and maintain precision agriculture equipment.
04.0 Implement data collection and management techniques for agricultural systems.
05.0 Apply soil health management practices.
06.0 Utilize water resource management strategies.
07.0 Conduct crop monitoring and management using precision techniques.
08.0 Analyze economic principles relevant to precision agriculture.
09.0 Develop integrated pest and nutrient management plans.
10.0 Evaluate emerging technologies in precision agriculture.
11.0 Implement climate-smart agricultural strategies.
12.0 Demonstrate workplace readiness and professionalism.
13.0 Apply regulations and safety protocols in agricultural operations.
14.0 Perform communication activities.

Florida Department of Education
Student Performance Standards

Program Title: **Precision Agriculture Technology**
CIP Number: **1101000001**
Program Length: **60 credit hours**

At the completion of this program, the student will be able to:	
01.0	Explain the principles of precision agriculture. The student will be able to:
01.01	Define the core concepts and objectives of precision agriculture.
01.02	Explain the benefits of precision agriculture in terms of efficiency, sustainability, and profitability.
01.03	Describe the historical development and adoption of precision agriculture technologies.
01.04	Identify the challenges and limitations associated with precision farming.
02.0	Utilize geospatial technologies in agricultural applications. The student will be able to:
02.01	Use GPS technology for field navigation, mapping, and data collection.
02.02	Create field maps using GIS software to analyze spatial data.
02.03	Interpret prescription maps for variable-rate applications.
02.04	Integrate multiple layers of geospatial data for management zone analysis.
03.0	Operate and maintain precision agriculture equipment. The student will be able to:
03.01	Operate precision planting, fertilizing, and spraying equipment.
03.02	Calibrate precision machinery for accurate data collection and input application.
03.03	Troubleshoot and maintain common hardware and software systems used in precision agriculture.
03.04	Evaluate the performance of precision equipment in real-world agricultural operations.
04.0	Implement data collection and management techniques for agricultural systems. The student will be able to:
04.01	Collect data using sensors, drones, and remote sensing platforms.
04.02	Organize and store agricultural data in compliance with industry standards.
04.03	Analyze data to identify trends, patterns, and variability in agricultural systems.
04.04	Use digital tools to create reports and visualizations.
04.05	Address ethical considerations in data collection, use, and sharing.
04.06	Utilize farm management software for data analysis and decision-making.

	04.07 Generate reports and maps to inform agricultural operations.
	04.08 Integrate cloud-based systems for real-time collaboration and data sharing.
	04.09 Ensure data security and compliance with privacy standards.
05.0	Apply soil health management practices. The student will be able to:
	05.01 Conduct soil sampling using grid and zone sampling techniques.
	05.02 Analyze soil test results to develop site-specific fertility plans.
	05.03 Recommend practices to improve soil health, such as cover cropping and reduced tillage.
	05.04 Monitor soil properties over time to assess the impact of management practices.
	05.05 Monitor and enhance soil organic matter and biodiversity.
06.0	Utilize water resource management strategies. The student will be able to:
	06.01 Design and manage irrigation systems using precision agriculture tools.
	06.02 Monitor soil moisture levels using sensors and other technologies.
	06.03 Implement variable-rate irrigation (VRI) to optimize water use.
	06.04 Evaluate the impact of irrigation practices on water conservation and crop health.
07.0	Conduct crop monitoring and management using precision techniques. The student will be able to:
	07.01 Use remote sensing and drones to monitor crop health and identify stress areas.
	07.02 Develop site-specific strategies for pest, disease, and weed management.
	07.03 Evaluate crop performance using yield monitors and other post-harvest data.
	07.04 Implement in-season adjustments based on real-time monitoring data.
08.0	Analyze economic principles relevant to precision agriculture. The student will be able to:
	08.01 Conduct cost-benefit analyses for precision agriculture technologies.
	08.02 Assess the return on investment (ROI) for variable-rate applications and equipment.
	08.03 Develop budgets and financial models for precision agriculture operations.
	08.04 Evaluate the economic impacts of precision agriculture on long-term profitability.
09.0	Develop integrated pest and nutrient management plans. The student will be able to:
	09.01 Develop site-specific integrated pest management (IPM) strategies.
	09.02 Use prescription maps for precise nutrient and pesticide applications.

	09.03 Monitor pest and nutrient dynamics to evaluate management effectiveness.
	09.04 Incorporate sustainability into pest and nutrient management plans.
10.0	Evaluate emerging technologies in precision agriculture. The student will be able to:
	10.01 Identify the potential impact and applications of emerging technological innovations in precision agriculture.
	10.02 Monitor advancements in automation, connectivity, and intelligent systems.
	10.03 Assess the role of digital technologies in improving data management and traceability.
11.0	Implement climate-smart agricultural strategies. The student will be able to:
	11.01 Integrate precision technologies to address climate variability and extremes.
	11.02 Develop strategies for drought and flood resilience.
	11.03 Monitor greenhouse gas emissions and implement carbon sequestration practices.
12.0	Demonstrate workplace readiness and professionalism. The student will be able to:
	12.01 Demonstrate critical thinking and problem-solving skills for agricultural challenges.
	12.02 Exhibit professionalism, teamwork, and adaptability in the workplace.
	12.03 Demonstrate effective time management skills.
	12.04 Identify and demonstrate acceptable work habits.
13.0	Apply regulations and safety protocols in agricultural operations. The student will be able to:
	13.01 Identify local, state, and federal regulations relevant to precision agriculture.
	13.02 Follow and demonstrate safety procedures when operating drones, machinery, and chemicals to ensure compliance with safety standards.
	13.03 Identify best practices for environmental and data management compliance.
14.0	Perform communication activities. The student will be able to:
	14.01 Prepare, outline, and deliver an effective short oral presentation.
	14.02 Demonstrate ability to communicate effectively with diverse populations.
	14.03 Work collaboratively in interdisciplinary teams on problem-solving activities.
	14.04 Give, follow, and interpret oral and written communication.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Planned and supervised occupational activities may be provided through directed laboratory experiences, practicums, or cooperative learning experiences. When the cooperative method of instruction is utilized, the following is required for each student: a training plan, signed by the student, instructor, and employer, outlining instructional objectives and a list of on-the-job and in-school learning experiences. The workstation must include equipment, skills, and tasks relevant to the precision agriculture technology field and align with the student's chosen career goals. Students may receive compensation for work performed during their cooperative learning experience.

General Education Course Requirements for AS and AAS Degrees

State Board of Education Rule 6A-14.030(4), F.A.C., identifies 15 credit hours as the minimum amount of general education coursework required in the Associate of Science (AS) degree and the Associate of Applied Science (AAS) degree. In addition, Rule 6A-14.0303, F.A.C., implements s. 1007.25, F.S., and requires students entering a technical education degree program in the 2022-2023 academic year, and thereafter, to complete at least one identified core course in each subject area as part of the general education course requirements (15 credit hours total) before a degree is awarded) The core subject areas include:

- Communication
- Humanities
- Mathematics
- Natural Sciences
- Social Sciences

Career and Technical Student Organization (CTSO)

Florida Future Farmers Association (FFA) is the co-curricular career and technical student organization(s) providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.