

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title: Aquaculture
Occupational Area: Agriscience and Natural Resources

Secondary

Program Numbers 8112001
CIP Number 0101.030300
Grade Level 9-12, 30, 31
Length 3 credits
Certification VOC AGRI @4
AGRI @4
AGRICULTUR 1 @2

- I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment in positions in the aquaculture industry, including: fish farmer (industry title); or to provide supplemental training for persons previously or currently employed in these occupations.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the agricultural industry; planning, management, finance, technical and production skills, underlying principles of technology, labor issues, community issues and health, safety and environmental issues.

The content includes, but is not limited to, instruction that prepares individuals for activities including the production and harvesting of aquatic animals and plants. Instruction in feeding, culturing, protecting, prompting, harvesting and marketing aquatic species for food and other uses, maintenance and operation of related equipment, employability skills, mathematics, basic biological sciences, computer skills, communications, and human-relations skills are also included.

This program consists of the following courses when offered at the secondary level:

- 8106810 - Agriscience Foundations 1
- 8112010 - Aquaculture 2
- 8112020 - Aquaculture 3

- II. **LABORATORY ACTIVITIES:** Agricultural laboratory activities are an integral part of this program, which includes the safe use of hand tools, portable power tools, soil and water sampling equipment, and specialized aquaculture/mariculture production and harvesting equipment.
- III. **SPECIAL NOTE:** The FFA (secondary) is the appropriate Career Technical Student Organization for providing leadership training and for reinforcing specific vocational skills. Career Technical Student Organizations, when provided, shall be an integral part of the vocational instructional program, and the activities of such

organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC.

Planned and supervised occupational activities must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, and (4) cooperative education.

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

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are 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 workstation that reflects equipment, skills, and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

When a secondary student with a disability is enrolled in a vocational class with modifications to the curriculum framework, the particular outcomes and student performance standards which the student must master to earn credit must be specified on an individual basis. The job or jobs for which the student is being trained should be reflected in the student's desired post school outcome statement on the Transition Individual Educational Plan (Transition IEP).

IV. **INTENDED OUTCOMES:** After successfully completing this program, the student will be able to:

Occupational Completion Point - Data Code A
Fish Farmer (Industry Title)

- 01.0 Describe the socioeconomic role of the agricultural industry.
- 02.0 Apply scientific and technological principles to the agricultural industry.
- 03.0 Practice agricultural safety.
- 04.0 Demonstrate the use of tools, equipment and instruments in the agricultural industry.
- 05.0 Describe the principles of integrated pest management (IPM).
- 06.0 Describe the principles of plant and/or animal growth and reproduction.
- 07.0 Apply business skills and economic principles to the agricultural industry.
- 08.0 Explain the basic marketing processes in the agricultural industry.
- 09.0 Demonstrate human-relations, communications, and leadership skills.
- 10.0 Describe the nature and origin of and career opportunities in aquaculture and mariculture.

- 11.0 Apply biological principles to the reproduction, identification and growth of aquaculture and mariculture species.
- 12.0 Safely operate, maintain and repair machinery, equipment and facilities used in aquaculture and/or mariculture
- 13.0 Demonstrate the management and environmentally sound use of water and land resources.
- 14.0 Assist in the propagation and rearing of seed.
- 15.0 Assist in producing aquaculture or mariculture species in one or more of the following: ponds, cages, tanks, raceways, saltwater containment facilities.
- 16.0 Control disease, pest and water quality problems.
- 17.0 Assist in harvesting and processing aquaculture or mariculture species.
- 18.0 Describe procedures used in locating markets and marketing aquaculture products and/or mariculture products.
- 19.0 Apply business management skills in managing an aquaculture and/or mariculture operation.
- 20.0 Identify applicable local, state, and federal rules and regulations and assistance programs.
- 21.0 Identify technological advances in the industry.
- 22.0 Demonstrate leadership, employability, communications and human relations skills.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Aquaculture
Secondary Number: 8112001
Postsecondary Number:

Occupational Completion Point - Data Code A
Fish Farmer (Industry Title)

01.0 DESCRIBE THE SOCIOECONOMIC ROLE OF THE AGRICULTURAL INDUSTRY—The student will be able to:

- 01.01 Prepare a report on the history of the agricultural industry.
- 01.02 Discuss the impact of agricultural products and services on the local, state, national, and global economy.
- 01.03 Investigate career opportunities in the agricultural industry and identify educational experiences necessary to prepare for those careers.
- 01.04 Discuss the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 APPLY SCIENTIFIC AND TECHNOLOGICAL PRINCIPLES TO THE AGRICULTURAL INDUSTRY—The student will be able to:

- 02.01 Discuss the importance of scientific classification in agriculture.
- 02.02 Use the scientific method to solve problems in agriculture.
- 02.03 Explain the use of genetics in agriculture, including probability applications.
- 02.04 Analyze the impact of recent technology on the agricultural industry.
- 02.05 Identify and describe the components of an ecosystem both biotic and abiotic.
- 02.06 Construct and analyze a diagram of a biological food web and subsequent food chains.
- 02.07 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 02.08 Evaluate soil profiles, land-capability classes, and soil conservation practices.
- 02.09 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sink holes, rivers, and swamps) and explain the importance of managing these resources.
- 02.10 Explain the interaction of one natural resource with another.
- 02.11 Describe the causes and effects of air, water, and land pollution and identify ways to prevent pollution.
- 02.12 Explain the flow of energy from the sun through agricultural systems.
- 02.13 Describe the environmental requirements necessary for a productive natural or man-made aquaculture system.
- 02.14 Apply principles of waste management to environmental problems common to agricultural systems.

- 02.15 Understand the concept of best management practices (BMP) as applied to agriculture.
 - 02.16 Identify advances in biotechnology impacting agriculture, such as transgenic crops and biological controls.
 - 02.17 Identify computer technology advances such as Geographic Information Systems (GIS) and Global Positioning Systems (GPS).
- 03.0 PRACTICE AGRICULTURAL SAFETY—The student will be able to:
- 03.01 List the most common causes of agricultural accidents.
 - 03.02 Discuss the importance of following proper safety precautions in the agricultural industry.
 - 03.03 Demonstrate safety procedures in the classroom, laboratory, and workplace.
 - 03.04 Describe symptoms of pesticide poisoning.
 - 03.05 Extract pertinent information from a pesticide label and Material Safety Data Sheet (MSDS).
 - 03.06 Select, mix, and apply a nonrestricted chemical, according to the label and according to Environmental Protection Agency (EPA), MSDS, and Worker Protection Standard regulations.
 - 03.07 Clean and store pesticide application equipment, safety clothing, and safety equipment.
 - 03.08 Identify the proper disposal of containers and residual pesticides.
 - 03.09 Discuss the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).
- 04.0 DEMONSTRATE THE USE OF TOOLS, EQUIPMENT AND INSTRUMENTS IN THE AGRICULTURAL INDUSTRY—The student will be able to:
- 04.01 Choose the proper tools, equipment, and instruments for a specific job.
 - 04.02 Describe the principles of selected mechanical applications (e.g. levers, pulleys, hydraulics, internal combustion).
 - 04.03 Calibrate spray equipment; solve time, distance, area, volume ratio, proportion, and percentage problems in agriscience.
 - 04.04 Demonstrate the ability to use an equipment manual.
 - 04.05 Demonstrate the use of selected tools, equipment, and instruments.
 - 04.06 Service, maintain, and store tools, equipment, instruments, and supplies.
- 05.0 DESCRIBE THE PRINCIPLES OF PEST MANAGEMENT—The student will be able to:
- 05.01 Identify types of pests and beneficials.
 - 05.02 Identify and select an appropriate control for each type of pest and/or weed.
 - 05.03 Describe the principles and benefits of integrated pest management.
- 06.0 DESCRIBE THE PRINCIPLES OF PLANT AND/OR ANIMAL NUTRIENT GROWTH AND REPRODUCTION—The student will be able to:

For plant:

- 06.01 Describe the structure functions of plant parts including roots, stems, leaves, and flowers.
- 06.02 Describe the processes of plant growth including photosynthesis, respiration and nutrient uptake.
- 06.03 Propagate plants through sexual and asexual means.
- 06.04 Identify the nutrients required for plant growth and development and the role of each.
- 06.05 Extract pertinent information from a fertilizer label.

For animal:

- 06.07 Identify the nutrients required for animal growth and development and the role of each.
- 06.08 Identify and describe the anatomical systems of animals and the functions of each, including major components.
- 06.09 Describe the process of animal reproduction.

07.0 APPLY BUSINESS SKILLS AND ECONOMIC PRINCIPLES TO THE AGRICULTURAL INDUSTRY—The student will be able to:

- 07.01 Explain the basic economic principles in the agricultural industry.
- 07.02 Explain the importance and impacts of local, state, and federal regulations and required documentation affecting the agricultural industry.
- 07.03 Describe the types of agribusiness by organizational structure (i.e. sole proprietorship, partnership, corporation, cooperatives).
- 07.04 Select and use computer applications.
- 07.05 Analyze and interpret agribusiness data.
- 07.06 Keep and maintain supervised agricultural experience (SAE) records.
- 07.07 Interpret legal descriptions of land.

08.0 EXPLAIN THE BASIC MARKETING PROCESSES IN THE AGRICULTURAL INDUSTRY—The student will be able to:

- 08.01 Describe key factors in marketing agricultural products.
- 08.02 Select agricultural products according to grades and standards.

09.0 DEMONSTRATE HUMAN-RELATIONS, COMMUNICATIONS, AND LEADERSHIP SKILLS—The student will be able to:

- 09.01 Demonstrate acceptable work habits and attitudes.
- 09.02 Correctly follow oral and written directions and ask questions that clarify directions, as needed.
- 09.03 Communicate effectively in verbal, written, and nonverbal modes.
- 09.04 Recognize and demonstrate good listening skills.
- 09.05 Conduct small informal and formal group meetings.
- 09.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.

- 09.07 Recognize and demonstrate communications skills in the workplace.
- 09.08 Demonstrate effective telephone skills.
- 10.0 DESCRIBE THE NATURE AND ORIGIN OF AND CAREER OPPORTUNITIES IN AQUACULTURE AND MARICULTURE—The students will be able to:
 - 10.01 List two definitions of aquaculture and explain their differences.
 - 10.02 Compare and contrast aquaculture with agriculture and aquaculture with fisheries.
 - 10.03 List examples of aquatic crops and animals.
 - 10.04 Trace the development of aquaculture.
 - 10.05 List and describe the nature of five areas of aquaculture occupations.
 - 10.06 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations.
- 11.0 APPLY BIOLOGICAL PRINCIPLES TO THE REPRODUCTION, IDENTIFICATION AND GROWTH OF AQUACULTURE/MARICULTURE SPECIES—The students will be able to:
 - 11.01 List and explain the meaning of morphology, anatomy and physiology.
 - 11.02 List and describe the physiology of aquatic animals.
 - 11.03 Identify and describe the basic structures and external anatomy of crustaceans.
 - 11.04 Identify and describe the basic structure and internal anatomy of an oyster or a mussel.
 - 11.05 Identify and describe the external and internal anatomy of fish.
 - 11.06 Identify and describe the basic morphology of aquatic macroalgae and microalgae.
 - 11.07 Determine why aquatic crops may be more productive than terrestrial crops.
 - 11.08 List and describe important characteristics in choosing a species.
 - 11.09 Develop an information file in aquaculture species.
 - 11.10 List and describe the major factors in the growth of aquatic fauna and flora.
 - 11.11 Identify aquaculture/mariculture species of commercial importance in your area.
- 12.0 SAFELY OPERATE, MAINTAIN AND REPAIR MACHINERY, EQUIPMENT AND FACILITIES USED IN AQUACULTURE AND/OR MARICULTURE—The student will be able to:
 - 12.01 Recognize and observe safety practices necessary in carrying out aquaculture activities.
 - 12.02 Maintain and perform basic repairs on aquaculture machinery, equipment and facilities.
 - 12.03 Safely operate aquaculture machinery and equipment.
- 13.0 DEMONSTRATE THE MANAGEMENT AND ENVIRONMENTALLY SOUND USE OF WATER AND LAND RESOURCES—The student will be able to:

- 13.01 Identify and describe the qualities water should possess for use in aquaculture.
 - 13.02 Explain how changes in water affect aquatic life.
 - 13.03 Explain, monitor and maintain freshwater/salt water quality standards for the production of desirable species.
 - 13.04 Calculate volume in circular, rectangular and irregular shaped water structures.
 - 13.05 List and explain sources of aquaculture pollution and methods of preventing and/or correcting these pollution problems.
 - 13.06 Determine soil types, land slope and other factors to consider in choosing a location for a manmade pond or other aquaculture operation.
 - 13.07 Identify/explain environmentally safe methods of aquaculture wastewater disposal.
 - 13.08 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
 - 13.09 Observe different stages of construction of ponds and/or other aquaculture production facilities.
- 14.0 ASSIST IN THE PROPAGATION AND REARING OF SEED—The student will be able to:
- 14.01 Identify factors to consider in determining whether to grow an aquaculture species.
 - 14.02 Identify/describe facilities used in a grow out operation.
 - 14.03 List sources of seed and how they are produced.
 - 14.04 Determine the purpose and functions of a hatchery.
 - 14.05 Identify and describe the sexual reproductive process and methods of reproducing aquaculture organisms.
 - 14.06 Identify and describe the spawning facilities used in aquaculture.
 - 14.07 Select a method of producing seed for an aqua farm.
 - 14.08 List and explain the process for hatching seed in different incubators.
 - 14.09 Determine kinds of feed to use in growing seed.
 - 14.10 Feed, grade and transport seed.
- 15.0 ASSIST IN PRODUCING AQUACULTURE OR MARICULTURE SPECIES IN ONE OR MORE OF THE FOLLOWING: PONDS, CAGES, TANKS, RACEWAYS, SALTWATER CONTAINMENT FACILITIES—The student will be able to:
- 15.01 Identify the types of growing systems and important factors in their selection, design and use.
 - 15.02 Determine economic factors to consider in choosing a system for commercial production.
 - 15.03 Identify and describe important growing facility construction and site requirements.
 - 15.04 Select species for specific growth facilities.
 - 15.05 Determine feeding methods and feed aquaculture species.
 - 15.06 Assist in managing water quality in different production systems.
 - 15.07 Develop an aquaculture production problem that will outline the financial requirements for startup, production, harvesting,

processing and marketing an aquaculture species and expected economic returns.

16.0 CONTROL DISEASE, PEST AND WATER QUALITY PROBLEMS—The student will be able to:

- 16.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.
- 16.02 Identify major pests of several locally important commercial species and list recommended control methods.
- 16.03 Perform methods of prevention, treatment, and control of the major diseases and pests previously identified.
- 16.04 Identify water quality problems.
- 16.05 Determine quality of water and practice recommended solutions where needed.
- 16.06 Apply the latest economically feasible technology in prevention, treatment and control of production problems.

17.0 ASSIST IN HARVESTING AND PROCESSING AQUACULTURE OR MARICULTURE SPECIES—The student will be able to:

- 17.01 Recognize and observe safety and sanitary practices in harvesting and processing aquaculture/mariculture species.
- 17.02 Determine harvesting practices recommended for commercially desirable aquaculture/mariculture species.
- 17.03 Determine equipment, labor, financial and legal requirements for harvesting.
- 17.04 Harvest commercially important aquaculture and/or mariculture species using recommended practices.
- 17.05 Determine processing practices recommended for commercially important species.
- 17.06 Determine equipment, labor, financial and legal requirements for processing.
- 17.07 Process commercially important species using recommended practices.

18.0 DESCRIBE PROCEDURES USED IN LOCATING MARKETS AND MARKETING AQUACULTURE AND/OR MARICULTURE PRODUCTS—The student will be able to:

- 18.01 Identify possible market outlets for aquaculture/mariculture products.
- 18.02 Develop a marketing plan for an aquaculture product commonly produced in the area.
- 18.03 Package and transport products as live, fresh, etc.
- 18.04 Determine legal and commercially important methods of transporting and marketing.
- 18.05 Market aquaculture and/or mariculture products.

19.0 APPLY BUSINESS MANAGEMENT SKILLS IN MANAGING AN AQUACULTURE AND/OR MARICULTURE OPERATION—The student will be able to:

- 19.01 Identify and list functions in the management process.
- 19.02 Demonstrate basic bookkeeping skills.

- 19.03 Determine cost of production/harvesting and profitability of different systems.
 - 19.04 Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.
 - 19.05 Complete forms related to (a) land purchase, (b) water leases, (c) permits, (d) licenses, (e) financial loans, (f) insurance, (g) others specified by the instructor.
 - 19.06 Keep records related to (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, (h) others specified by instructor.
 - 19.07 Operate a production/harvesting system.
 - 19.08 Complete supervised agricultural experience (SAE) records.
- 20.0 IDENTIFY APPLICABLE LOCAL, STATE AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS—The student will be able to:
- 20.01 Identify and observe laws and regulations affecting the industry in the local area.
 - 20.02 Obtain required permits, licenses, leases, etc. for production and harvesting.
 - 20.03 Identify and list agencies regulating the industry and their functions.
 - 20.04 Identify and list government assistance programs available to the industry.
- 21.0 IDENTIFY TECHNOLOGICAL ADVANCES IN THE INDUSTRY—The student will be able to:
- 21.01 Identify and use basic computer programs.
 - 21.02 Identify and analyze the economic feasibility of high technology machinery, equipment and systems available to the industry.
 - 21.03 Visit the latest technology displays and field days available in the area.
 - 21.04 Prepare a list of recent technological advances in the production/harvesting of aquaculture/mariculture products.
- 22.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN RELATIONS SKILLS—The student will be able to:
- 22.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.
 - 22.02 Identify acceptable work habits (ethics) and desired personal characteristics.
 - 22.03 Demonstrate acceptable employee-hygiene habits.
 - 22.04 Secure information about a job.
 - 22.05 Complete a job application.
 - 22.06 Demonstrate competence in job-interview techniques.
 - 22.07 Demonstrate proper office procedures.
 - 22.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.

22.09 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

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

COURSE DESCRIPTION:

This course was developed as a core and is designed to develop competencies in the areas of agricultural history; global importance of agriculture; career opportunities; applied scientific and technological concepts; ecosystems; agricultural safety; principles of integrated pest management; principles of plant and animal growth; economic principles; agricultural marketing; and human relations skills.

01.0 DESCRIBE THE SOCIOECONOMIC ROLE OF THE AGRICULTURAL INDUSTRY—The student will be able to:

- 01.01 Prepare a report on the history of the agricultural industry.
- 01.02 Discuss the impact of agricultural products and services on the local, state, national, and global economy.
- 01.03 Investigate career opportunities in the agricultural industry and identify educational experiences necessary to prepare for those careers.
- 01.04 Discuss the role of the agricultural industry in the interaction of population, food, energy, and the environment.

02.0 APPLY SCIENTIFIC AND TECHNOLOGICAL PRINCIPLES TO THE AGRICULTURAL INDUSTRY—The student will be able to:

- 02.01 Discuss the importance of scientific classification in agriculture.
- 02.02 Use the scientific method to solve problems in agriculture.
- 02.03 Explain the use of genetics in agriculture, including probability applications.
- 02.04 Analyze the impact of recent technology on the agricultural industry.
- 02.05 Identify and describe the components of an ecosystem both biotic and abiotic.
- 02.06 Construct and analyze a diagram of a biological food web and subsequent food chains.
- 02.07 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 02.08 Evaluate soil profiles, land-capability classes, and soil conservation practices.
- 02.09 List the components of Florida's fresh water systems (lakes, ground water, aquifer, sink holes, rivers, and swamps) and explain the importance of managing these resources.
- 02.10 Explain the interaction of one natural resource with another.
- 02.11 Describe the causes and effects of air, water, and land pollution and identify ways to prevent pollution.

- 02.12 Explain the flow of energy from the sun through agricultural systems.
 - 02.13 Describe the environmental requirements necessary for a productive natural or man-made aquaculture system.
 - 02.14 Apply principles of waste management to environmental problems common to agricultural systems.
 - 02.15 Understand the concept of best management practices (BMP) as applied to agriculture.
 - 02.16 Identify advances in biotechnology impacting agriculture, such as transgenic crops and biological controls.
 - 02.17 Identify computer technology advances such as Geographic Information Systems (GIS) and Global Positioning Systems (GPS).
- 03.0 PRACTICE AGRICULTURAL SAFETY—The student will be able to:
- 03.01 List the most common causes of agricultural accidents.
 - 03.02 Discuss the importance of following proper safety precautions in the agricultural industry.
 - 03.03 Demonstrate safety procedures in the classroom, laboratory, and workplace.
 - 03.04 Describe symptoms of pesticide poisoning.
 - 03.05 Extract pertinent information from a pesticide label and Material Safety Data Sheet (MSDS).
 - 03.06 Select, mix, and apply a nonrestricted chemical, according to the label and according to Environmental Protection Agency (EPA), MSDS, and Worker Protection Standard regulations.
 - 03.07 Clean and store pesticide application equipment, safety clothing, and safety equipment.
 - 03.08 Identify the proper disposal of containers and residual pesticides.
 - 03.09 Discuss the proper procedures of basic first aid and cardiopulmonary resuscitation (CPR).
- 04.0 DEMONSTRATE THE USE OF TOOLS, EQUIPMENT AND INSTRUMENTS IN THE AGRICULTURAL INDUSTRY—The student will be able to:
- 04.01 Choose the proper tools, equipment, and instruments for a specific job.
 - 04.02 Describe the principles of selected mechanical applications (e.g. levers, pulleys, hydraulics, internal combustion).
 - 04.03 Calibrate spray equipment; solve time, distance, area, volume ratio, proportion, and percentage problems in agriscience.
 - 04.04 Demonstrate the ability to use an equipment manual.
 - 04.05 Demonstrate the use of selected tools, equipment, and instruments.
 - 04.06 Service, maintain, and store tools, equipment, instruments, and supplies.
- 05.0 DESCRIBE THE PRINCIPLES OF PEST MANAGEMENT—The student will be able to:
- 05.01 Identify types of pests and beneficials.
 - 05.02 Identify and select an appropriate control for each type of pest and/or weed.

- 05.03 Describe the principles and benefits of integrated pest management.
- 06.0 DESCRIBE THE PRINCIPLES OF PLANT AND/OR ANIMAL NUTRIENT GROWTH AND REPRODUCTION—The student will be able to:
- For plant:
- 06.01 Describe the structure functions of plant parts including roots, stems, leaves, and flowers.
- 06.02 Describe the processes of plant growth including photosynthesis, respiration and nutrient uptake.
- 06.03 Propagate plants through sexual and asexual means.
- 06.04 Identify the nutrients required for plant growth and development and the role of each.
- 06.05 Extract pertinent information from a fertilizer label.
- For animal:
- 06.07 Identify the nutrients required for animal growth and development and the role of each.
- 06.08 Identify and describe the anatomical systems of animals and the functions of each, including major components.
- 06.09 Describe the process of animal reproduction.
- 07.0 APPLY BUSINESS SKILLS AND ECONOMIC PRINCIPLES TO THE AGRICULTURAL INDUSTRY—The student will be able to:
- 07.01 Explain the basic economic principles in the agricultural industry.
- 07.02 Explain the importance and impacts of local, state, and federal regulations and required documentation affecting the agricultural industry.
- 07.03 Describe the types of agribusiness by organizational structure (i.e. sole proprietorship, partnership, corporation, cooperatives).
- 07.04 Select and use computer applications.
- 07.05 Analyze and interpret agribusiness data.
- 07.06 Keep and maintain supervised agricultural experience (SAE) records.
- 07.07 Interpret legal descriptions of land.
- 08.0 EXPLAIN THE BASIC MARKETING PROCESSES IN THE AGRICULTURAL INDUSTRY—The student will be able to:
- 08.01 Describe key factors in marketing agricultural products.
- 08.02 Select agricultural products according to grades and standards.
- 09.0 DEMONSTRATE HUMAN-RELATIONS, COMMUNICATIONS, AND LEADERSHIP SKILLS—The student will be able to:
- 09.01 Demonstrate acceptable work habits and attitudes.
- 09.02 Correctly follow oral and written directions and ask questions that clarify directions, as needed.

- 09.03 Communicate effectively in verbal, written, and nonverbal modes.
- 09.04 Recognize and demonstrate good listening skills.
- 09.05 Conduct small informal and formal group meetings.
- 09.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.
- 9.7 Recognize and demonstrate communications skills in the workplace.
- 09.08 Demonstrate effective telephone skills.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8112010
Course Title: Aquaculture 2
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.

10.0 DESCRIBE THE NATURE AND ORIGIN OF AND CAREER OPPORTUNITIES IN AQUACULTURE AND MARICULTURE—The students will be able to:

- 10.01 List two definitions of aquaculture and explain their differences.
- 10.02 Compare and contrast aquaculture with agriculture and aquaculture with fisheries.
- 10.03 List examples of aquatic crops and animals.
- 10.04 Trace the development of aquaculture.
- 10.05 List and describe the nature of five areas of aquaculture occupations.
- 10.06 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations.

11.0 APPLY BIOLOGICAL PRINCIPLES TO THE REPRODUCTION, IDENTIFICATION AND GROWTH OF AQUACULTURE AND MARICULTURE SPECIES—The students will be able to:

- 11.01 List and explain the meaning of morphology, anatomy and physiology.
- 11.02 List and describe the physiology of aquatic animals.
- 11.03 Identify and describe the basic structures and external anatomy of crustaceans.
- 11.04 Identify and describe the basic structure and internal anatomy of an oyster or a mussel.
- 11.05 Identify and describe the external and internal anatomy of fish.
- 11.06 Identify and describe the basic morphology of aquatic macroalgae and microalgae.
- 11.07 Determine why aquatic crops may be more productive than terrestrial crops.
- 11.08 List and describe important characteristics in choosing a species.
- 11.09 Develop an information file in aquaculture species.
- 11.10 List and describe the major factors in the growth of aquatic fauna and flora.
- 11.11 Identify aquaculture/mariculture species of commercial importance in your area.

- 12.0 SAFELY OPERATE, MAINTAIN AND REPAIR MACHINERY, EQUIPMENT AND FACILITIES USED IN AQUACULTURE AND/OR MARICULTURE—The student will be able to:
- 12.01 Recognize and observe safety practices necessary in carrying out aquaculture activities.
 - 12.02 Maintain and perform basic repairs on aquaculture machinery, equipment and facilities.
 - 12.03 Safely operate aquaculture machinery and equipment.
- 13.0 DEMONSTRATE THE MANAGEMENT AND ENVIRONMENTALLY SOUND USE OF WATER AND LAND RESOURCES—The student will be able to:
- 13.01 Identify and describe the qualities water should possess for use in aquaculture.
 - 13.02 Explain how changes in water affect aquatic life.
 - 13.03 Explain, monitor and maintain freshwater/salt water quality standards for the production of desirable species.
- 14.0 ASSIST IN THE PROPAGATION AND REARING OF SEED—The student will be able to:
- 14.01 Identify factors to consider in determining whether to grow an aquaculture species.
 - 14.02 Identify/describe facilities used in a grow out operation.
 - 14.03 List sources of seed and how they are produced.
 - 14.04 Determine the purpose and functions of a hatchery.
- 18.0 DESCRIBE PROCEDURES USED IN LOCATING MARKETS AND MARKETING AQUACULTURE AND/OR MARICULTURE PRODUCTS—The student will be able to:
- 18.01 Identify possible market outlets for aquaculture/mariculture products.
- 19.0 APPLY BUSINESS MANAGEMENT SKILLS IN MANAGING AN AQUACULTURE AND/OR MARICULTURE OPERATION—The student will be able to:
- 19.01 Identify and list functions in the management process.
 - 19.02 Demonstrate basic bookkeeping skills.
 - 19.08 Complete supervised agricultural experience (SAE) records.
- 20.0 IDENTIFY APPLICABLE LOCAL, STATE AND FEDERAL RULES AND REGULATIONS AND ASSISTANCE PROGRAMS—The student will be able to:
- 20.01 Identify and observe laws and regulations affecting the industry in the local area.
 - 20.02 Obtain required permits, licenses, leases, etc. for production and harvesting.
 - 20.03 Identify and list agencies regulating the industry and their functions.
 - 20.04 Identify and list government assistance programs available to the industry.

- 21.0 IDENTIFY TECHNOLOGICAL ADVANCES IN THE INDUSTRY—The student will be able to:
- 21.01 Identify and use basic computer programs.
 - 21.02 Identify and analyze the economic feasibility of high technology machinery, equipment and systems available to the industry.
 - 21.03 Visit the latest technology displays and field days available in the area.
 - 21.04 Prepare a list of recent technological advances in the production/harvesting of aquaculture/mariculture products.
- 22.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN RELATIONS SKILLS—The student will be able to:
- 22.01 Conduct group meetings, using parliamentary procedure and public-speaking skills.
 - 22.02 Identify acceptable work habits (ethics) and desired personal characteristics.
 - 22.03 Demonstrate acceptable employee-hygiene habits.
 - 22.04 Secure information about a job.
 - 22.05 Complete a job application.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8112020
Course Title: Aquaculture 3
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 or mariculture 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.

13.0 DEMONSTRATE THE MANAGEMENT AND ENVIRONMENTALLY SOUND USE OF WATER AND LAND RESOURCES—The student will be able to:

- 13.04 Calculate volume in circular, rectangular and irregular shaped water structures.
- 13.05 List and explain sources of aquaculture pollution and methods of preventing and/or correcting these pollution problems.
- 13.06 Determine soil types, land slope and other factors to consider in choosing a location for a man made pond or other aquaculture operation.
- 13.07 Identify/explain environmentally safe methods of aquaculture wastewater disposal.
- 13.08 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
- 13.09 Observe different stages of construction of ponds and/or other aquaculture production facilities.

14.0 ASSIST IN THE PROPAGATION AND REARING OF SEED—The student will be able to:

- 14.05 Identify and describe the sexual reproductive process and methods of reproducing aquaculture organisms.
- 14.06 Identify and describe the spawning facilities used in aquaculture.
- 14.07 Select a method of producing seed for an aqua farm.
- 14.08 List and explain the process for hatching seed in different incubators.
- 14.09 Determine kinds of feed to use in growing seed.
- 14.10 Feed, grade and transport seed.

15.0 ASSIST IN PRODUCING AQUACULTURE OR MARICULTURE SPECIES IN ONE OR MORE OF THE FOLLOWING: PONDS, CAGES, TANKS, RACEWAYS, SALTWATER CONTAINMENT FACILITIES—The student will be able to:

- 15.01 Identify the types of growing systems and important factors in their selection, design and use.

- 15.02 Determine economic factors to consider in choosing a system for commercial production.
 - 15.03 Identify and describe important growing facility construction and site requirements.
 - 15.04 Select species for specific growth facilities.
 - 15.05 Determine feeding methods and feed aquaculture species.
 - 15.06 Assist in managing water quality in different production systems.
 - 15.07 Develop an aquaculture production problem that will outline the financial requirements for startup, production, harvesting, processing and marketing an aquaculture species and expected economic returns.
- 16.0 CONTROL DISEASE, PEST AND WATER QUALITY PROBLEMS—The student will be able to:
- 16.01 Identify major diseases of several locally important commercial species and list different methods of prevention and treatment.
 - 16.02 Identify major pests of several locally important commercial species and list recommended control methods.
 - 16.03 Perform methods of prevention, treatment and control of the major diseases and pests previously identified.
 - 16.04 Identify water quality problems.
 - 16.05 Determine quality of water and practice recommended solutions where needed.
 - 16.06 Apply the latest economically feasible technology in prevention, treatment and control of production problems.
- 17.0 ASSIST IN HARVESTING AND PROCESSING AQUACULTURE OR MARICULTURE SPECIES—The student will be able to:
- 17.01 Recognize and observe safety and sanitary practices in harvesting and processing aquaculture/mariculture species.
 - 17.02 Determine harvesting practices recommended for commercially desirable aquaculture/mariculture species.
 - 17.03 Determine equipment, labor, financial and legal requirements for harvesting.
 - 17.04 Harvest commercially important aquaculture and/or mariculture species using recommended practices.
 - 17.05 Determine processing practices recommended for commercially important species.
 - 17.06 Determine equipment, labor, financial and legal requirements for processing.
 - 17.07 Process commercially important species using recommended practices.
- 18.0 DESCRIBE PROCEDURES USED IN LOCATING MARKETS AND MARKETING AQUACULTURE AND/OR MARICULTURE PRODUCTS—The student will be able to:
- 18.02 Develop a marketing plan for an aquaculture product commonly produced in the area.
 - 18.03 Package and transport products as live, fresh, etc.
 - 18.04 Determine legal and commercially important methods of transporting and marketing.
 - 18.05 Market aquaculture and/or mariculture products.

19.0 APPLY BUSINESS MANAGEMENT SKILLS IN MANAGING AN AQUACULTURE AND/OR MARICULTURE OPERATION—The student will be able to:

- 19.03 Determine cost of production/harvesting and profitability of different systems.
- 19.04 Determine procedures and costs for acquiring the land/water, machinery, equipment structures, etc., needed for an operation specified by the instructor.
- 19.05 Complete forms related to (a) land purchase, (b) water leases, (c) permits, (d) licenses, (e) financial loans, (f) insurance, (g) others specified by the instructor.
- 19.06 Keep records related to: (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, (h) others specified by instructor.
- 19.07 Operate a production/harvesting system.
- 19.08 Complete supervised occupational experienced (SAE) records.

22.0 DEMONSTRATE LEADERSHIP, EMPLOYABILITY, COMMUNICATION, AND HUMAN RELATIONS SKILLS—The student will be able to:

- 22.06 Demonstrate competence in job-interview techniques.
- 22.07 Demonstrate proper office procedures.
- 22.08 Demonstrate appropriate response to criticism from employer, supervisor, or other persons in the workplace.
- 22.09 Demonstrate knowledge of how to appropriately make a career change, including resigning from a job.