2012 - 2013

Florida Department of Education
Curriculum Framework

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

Secondary – Career Preparatory	
Program Number	8916000
CIP Number	0715059904
Grade Level	9-12, 30, 31
Standard Length	4 credits
Teacher Certification	AGRICULTUR 1 @2 WSP OPER @7 G BIOLOGY 1
CTSO	FPSA or FFA
SOC Codes (all applicable)	17-3025
Facility Code	203 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

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 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 water resources sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to knowledge of federal, state, and local regulations; ecosystem awareness; problem recognition; water quality issues; solid and liquid waste management issues; air quality issues; managing hazardous materials; managing forests, wetlands, fisheries, and wildlife; planning and administering land use; protecting resources;

conducting site assessments; sampling procedures; safety procedures; compliance monitoring and quality assurance procedures; and instruction in environmental technology.

Program Structure

This program is a planned sequence of instruction consisting of four courses and two occupational completion points.

The following table illustrates the secondary program structure:

OCP	Course Number	Course Title	Length	SOC Code	Level
A	8913010	Introduction to Environmental Technology	1 credit	17-3025	2
	8913020	Environmental Technology 2	1 credit		2
B	8916010	Water Quality Resources 3	1 credit	17-3025	3
	8916020	Water Quality Resources 4	1 credit		3

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Career and Technical Student Organization (CTSO)

FPSA or FFA is the appropriate 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. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

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.

Essential Skills

Essential skills identified by the Division of Career and Adult Education have been integrated into the standards and benchmarks of this program. These skills represent the general knowledge and skills considered by industry to be essential for success in careers across all career clusters. Students preparing for a career served by this program at any level should be able to demonstrate these skills in the context of this program. A complete list of Essential Skills and links to instructional resources in support of these Essential Skills are published on the CTE Essential Skills page of the FL-DOE website (http://www.fldoe.org/workforce/dwdframe/essential_skills.asp).

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's 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 postsecondary service provider. 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 Individual Educational Plan (IEP) served in Exceptional Student Education or 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 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 Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). 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 an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. 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).

Articulation

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Bright Futures/Gold Seal Scholarship

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. Eligibility requirements are available online at https://www.osfaffelp.org/bfiehs/fnbpcm02_CCTMain.aspx.

Fine Arts/Practical Arts Credit

Many courses in CTE programs meet the Fine Arts/Practical Arts credit for high school graduation. A listing of approved CTE courses is published each year as a supplemental resource to the Course Code Directory (http://www.fldoe.org/articulation/CCD/default.asp).

Standards

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

01.0 Describe hydrology.
02.0 Practice safety skills and procedures.
03.0 Demonstrate sampling procedures.
04.0 Discuss related standards and regulations.
05.0 Conduct site assessment.
06.0 Describe related geologic principles.
07.0 Manage wetlands.
08.0 Manage wildlife.
09.0 Manage forests.
10.0 Identify career opportunities and organizational dynamics.
11.0 Describe water treatment techniques.
12.0 Describe stormwater systems.
13.0 Manage data and physical resources.
14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems.
15.0 Manage hazardous materials.
16.0 Control incidents.
17.0 Prepare preplanning.
18.0 Perform remediation.
19.0 Collect and dispose of solid waste.
20.0 Identify continuing education needs and opportunities.
21.0 Demonstrate language arts knowledge and skills.
22.0 Demonstrate mathematics knowledge and skills.
23.0 Demonstrate science knowledge and skills.
24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas.
25.0 Solve problems using critical thinking skills, creativity and innovation.
26.0 Use information technology tools.
27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.
28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
30.0 Describe the importance of professional ethics and legal responsibilities.
31.0 Explain the importance of employability skill and entrepreneurship skills.
32.0 Demonstrate personal money-management concepts, procedures, and strategies.
33.0 Discuss hydrology.
34.0 Conduct water sampling.
35.0 Discuss geology principles of water resources.
36.0 Explain water treatment techniques.
37.0 Discuss stormwater systems.
38.0 Describe water distribution.
39.0 Demonstrate the management and environmentally sound use of water resources.
40.0 Manage fisheries.
41.0 Maintain water treatment equipment and facilities.
42.0 Inspect and maintain drainage systems.

43.0 Describe the nature and origin of and career opportunities in aquaculture, mariculture and other hydrological industries.
44.0 Identify career opportunities and organizational dynamics in water resources.
45.0 Demonstrate water treatment techniques.
46.0 Compliance monitoring/inspection.
47.0 Discuss comprehensive quality assurance plan.

2012 - 2013

Florida Department of Education
Student Performance Standards

Course Title: **Introduction to Environmental Technology**
Course Number: **8913010**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas of hydrology, environmental standards and regulations, site assessment, geologic principles, 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.

01.0 Describe hydrology--The student will be able to:

- 01.01 Define basic hydrological terms.
- 01.02 Explain surface water systems.
- 01.03 Explain ground water systems.
- 01.04 Describe and diagram the water, carbon, nitrogen, oxygen, sulfur, and phosphorus cycles.
- 01.05 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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.01 Demonstrate proper safety precautions and use of common laboratory, testing, and personal protective equipment.
- 02.02 Identify and utilize safe work practices.
- 02.03 Identify physical, chemical, biological, and zoological hazards.
- 02.04 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, Occupational Safety and Health Agency (OSHA), and Hazard Communication (HAZCOM) regulations.
- 02.05 Determine, review, and follow regulations.
- 02.06 Develop and maintain appropriate safety records.
- 02.07 Identify and describe “on the job” hazards and risks including fire/explosive, lead asbestos, and weather hazards.
- 02.08 Perform lifting activities safely.
- 02.09 Identify ladder safety and fall protection.
- 02.10 Become certified in first aid/CPR and describe First Responder responsibilities.

03.0 Demonstrate sampling procedure--The student will be able to:

- 03.01 Define sampling objectives and protocol.
- 03.02 Operate, calibrate, and maintain sampling equipment.
- 03.03 Develop sampling strategy.
- 03.04 Perform applicable field measurements.

03.05 Appropriately preserve, document, and dispose of samples.
03.06 Identify cross-contamination and other risks associated with sampling.
03.07 Describe, plan, and utilize quality assurance practices.
03.08 Submit samples for analysis.
03.09 Perform periodic follow-up sampling.

04.0 Discuss related standards and regulations--The student will be able to:

04.01 Explain the importance and impacts of local, state, and federal regulations and required documentation.
04.02 Describe the Florida Administrative Code's (F.A.C.) impact on environmental issues.
04.03 Discuss the Clean Water Act.
04.04 Identify local, state, and national regulatory agencies and discuss their roles in relation to state and federal laws and statures.
04.05 Research how rules and laws are made and mandated.
04.06 Research and report how endangered species get listed.
04.07 Describe permitting procedures.
04.08 Identify regulation resources.
04.09 Describe various licensing procedures.

05.0 Conduct site assessment--The student will be able to:

05.01 Identify the purposes of site assessment.
05.02 Describe required documentation.
05.03 Identify the phases of site assessment.
05.04 Obtain background design information
05.05 Verify blueprint accuracy.
05.06 Conduct manual survey.
05.07 Obtain physical and performance measurements.
05.08 Determine system safety impacts.
05.09 Determine possible nature and extent of exposure.
05.10 Assess needed equipment and processes.
05.11 Identify type of mechanical systems required.
05.12 Determine operational criteria.
05.13 Recommend corrective action.

06.0 Describe related geologic principles--The student will be able to:

06.01 Explain the geological history of Florida.
06.02 Create a soil profile and describe the associated components.
06.03 Evaluate soil profiles, land-capability classes, and soil conservation practices.
06.04 Interpret legal descriptions of land.
06.05 Identify mapping and surveying techniques and equipment.

07.0 Manage wetlands--The student will be able to:

07.01 Identify ecosystems.
07.02 Discuss the structure and function of wetlands.
07.03 Define limits of wetlands.
07.04 Discuss habitat value.

07.05 Identify fauna and flora.
07.06 Determine desirable vs. nuisance plant and animal species.

08.0 Manage wildlife--The student will be able to:

08.01 Identify and compare wildlife species.
08.02 Identify and describe life histories of game species.
08.03 Identify and describe life histories of non-game species.
08.04 Discuss urban wildlife management.
08.05 Describe community ecology.
08.06 Identify and practice wildlife techniques and principles.
08.07 Discuss population dynamics.

09.0 Manage forests--The student will be able to:

09.01 Describe dendrology.
09.02 Describe silviculture.
09.03 Identify and demonstrate replanting techniques.
09.04 Discuss harvesting techniques.
09.05 Identify timber stand improvement.
09.06 Identify timber and forest products.

10.0 Identify career opportunities and organizational dynamics--The student will be able to:

10.01 Identify careers and opportunities in the following fields: Surface/stormwater, drinking water, wastewater, groundwater, land resources, air quality, solid waste, and HAZMAT.
10.02 Compare supervisory and administrative responsibilities.
10.03 Identify organizational structures.
10.04 Identify team building communication skills.
10.05 Identify problem-solving techniques.
10.06 Identify employee responsibility/benefits.
10.07 Identify legal aspects of personnel relations.
10.08 Communicate effectively in verbal, written, and nonverbal modes.
10.09 Recognize and demonstrate good listening skills.
10.10 Conduct small informal and formal group meetings.
10.11 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.

21.0 Demonstrate language arts knowledge and skills--The students will be able to: AF2.0

21.01 Locate, comprehend and evaluate key elements of oral and written information. AF2.4
21.02 Draft, revise, and edit written documents using correct grammar, punctuation and vocabulary. AF2.5
21.03 Present information formally and informally for specific purposes and audiences. AF2.9

22.0 Demonstrate mathematics knowledge and skills--The students will be able to: AF3.0

22.01 Demonstrate knowledge of arithmetic operations. AF3.2

22.02 Analyze and apply data and measurements to solve problems and interpret documents. AF3.4
22.03 Construct charts/tables/graphs using functions and data. AF3.5

23.0 Demonstrate science knowledge and skills--The students will be able to: AF4.0

23.01 Discuss the role of creativity in constructing scientific questions, methods and explanations. AF4.1
23.02 Formulate scientifically investigable questions, construct investigations, collect and evaluate data, and develop scientific recommendations based on findings. AF4.3

24.0 Use oral and written communication skills in creating, expressing and interpreting information and ideas--The students will be able to:

24.01 Select and employ appropriate communication concepts and strategies to enhance oral and written communication in the workplace. CM1.0
24.02 Locate, organize and reference written information from various sources. CM3.0
24.03 Design, develop and deliver formal and informal presentations using appropriate media to engage and inform diverse audiences. CM5.0
24.04 Interpret verbal and nonverbal cues/behaviors that enhance communication. CM6.0
24.05 Apply active listening skills to obtain and clarify information. CM7.0
24.06 Develop and interpret tables and charts to support written and oral communications. CM8.0
24.07 Exhibit public relations skills that aid in achieving customer satisfaction. CM10.0

25.0 Solve problems using critical thinking skills, creativity and innovation--The students will be able to:

25.01 Employ critical thinking skills independently and in teams to solve problems and make decisions. PS1.0
25.02 Employ critical thinking and interpersonal skills to resolve conflicts. PS2.0
25.03 Identify and document workplace performance goals and monitor progress toward those goals. PS3.0
25.04 Conduct technical research to gather information necessary for decision-making. PS4.0

2012 - 2013

Florida Department of Education
Student Performance Standards

Course Title: **Environmental Technology 2**
Course Number: **8913020**
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.

02.0 Practice safety skills and procedures--The student will be able to:

- 02.11 Identify safety procedures for: Wells, pumps, electrical equipment, motor vehicles, buildings, and other necessary equipment.
- 02.12 Handle compressed gasses, solids, and liquids safely.
- 02.13 Summarize “Right of Access” law.
- 02.14 Summarize “Confined Space” regulations.
- 02.15 Identify Zero Tolerance policies.
- 02.16 Identify employee limitations.
- 02.17 Identify appropriate decontamination procedures.
- 02.18 Identify principles of toxicology.
- 02.19 Identify routes of exposure.
- 02.20 Identify respirator safety procedures.
- 02.21 Discuss history of hazardous materials and hazardous categories.
- 02.22 Discuss common chemical compatibility.

04.0 Discuss related standards and regulations--The student will be able to:

- 04.10 Identify appropriate agencies and their functions
- 04.11 Describe the role of environmental protection.
- 04.12 Interpret the Regulatory File System.
- 04.13 Create, evaluate and present a well-head protection plan.

10.0 Identify career opportunities and organizational dynamics--The student will be able to:

- 10.11 Recognize and demonstrate effective communications skills in the workplace.
- 10.12 Design and conduct presentations.

11.0 Describe water treatment techniques--The student will be able to:

- 11.01 Understand pretreatment, primary, secondary, and tertiary treatment processes of wastewater.
- 11.02 Describe disposal options.
- 11.03 Identify septic tanks types and functions.

12.0 Describe stormwater systems--The student will be able to:

12.01 Research current construction trends and methods of stormwater systems.
12.02 Define topography and its effects on stormwater.

13.0 Manage data and physical resources--The student will be able to:

13.01 Utilize word processing, databases, computer graphics, statistics programs, spreadsheets, Internet, GIS, and security.
13.02 Identify possible funding sources.
13.03 Prepare budgets and purchase orders.
13.04 Prepare a time management plan.
13.05 Utilize information databases.
13.06 Locate and interpret printed reference materials.
13.07 Describe network opportunities.
13.08 Maintain necessary/required record keeping practices and procedures.
13.09 Keep inventory, time sheets, and equipment maintenance logs.
13.10 Identify suppliers and technical resources.

14.0 Use Geographic Informational (GIS) and Global Positioning (GPS) Systems--The student will be able to:

14.01 Define GIS and its function.
14.02 Use GIS software.
14.03 Learn GIS applications.
14.04 Download LANDSTAT Satellite system into GIS.
14.05 Develop a GIS model.
14.06 Define GPS and its function.
14.07 Collect GPS data and load on GIS.
14.08 Research and identify other remote sensing tools.

15.0 Manage hazardous materials--The student will be able to:

15.01 Describe flow and life cycles of materials.
15.02 Identify proper chemical handling and storage guidelines.
15.03 Describe material management procedures.
15.04 Identify waste minimization, pollution prevention and alternatives to disposal.
15.05 Describe waste determination procedures.
15.06 Describe storage tank procedures.
15.07 Identify biochemical/medical waste.
15.08 Describe shipping and transportation procedures of hazardous materials.
15.09 Identify and interpret phase I and II audits.
15.10 Interpret closure reports.
15.11 Write contamination assessment reports.

16.0 Control incidents--The student will be able to:

16.01 Identify and describe reasons for controlling incidents.
16.02 Describe levels of response.
16.03 Determine and use proper chain of command.

16.04 Determine methods of control.
16.05 Demonstrate site access restriction methods.
16.06 Identify appropriate authorities to be notified.
16.07 Place equipment appropriately.
16.08 Orient zones.
16.09 Identify possible geographic hazards.
16.10 Identify media protocol and procedures for communicating with the public.
16.11 Prepare a press release for a mock incident

17.0 Prepare a plan--The student will be able to:

17.01 Describe the need for and types of pre-planning.
17.02 Identify and select necessary agency involvement.
17.03 Identify possible contamination zones.
17.04 Create contention plans for hurricane, tornadoes, floods, fires, and nuclear accidents.
17.05 Discuss Superfund Amendments Reauthorization Act (SARA) also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) regulations.
17.06 Create plan for deployment.
17.07 Evaluate contingency plans.
17.08 Write a contingency plan.
17.09 Conduct mock disaster activities.

18.0 Perform remediation--The student will be able to:

18.01 Research appropriate cleaning methods.
18.02 Create a plan for a disaster clean up including needed materials and equipment.
18.03 Conduct entry and closure methods.
18.04 Identify contamination removal procedures.
18.05 Design a site/system cleanliness verification procedure.
18.06 Identify tear down and demobilization procedures.

19.0 Collect and dispose of solid waste--The student will be able to:

19.01 Describe history of solid waste disposal.
19.02 Identify types of waste.
19.03 Research and evaluate solid waste disposal options. (Landfill, incineration, and composting, etc.)

20.0 Identify continuing education needs and opportunities--The student will be able to:

20.01 Determine continuing education needs/goals.
20.02 Identify available educational and financial resources.
20.03 Identify appropriate professional associations and attend meetings where applicable.
20.04 Read and review trade journals.

26.0 Use information technology tools--The students will be able to:

27.01 Use Personal Information Management (PIM) applications to increase workplace efficiency. IT1.0

27.02 Employ technological tools to expedite workflow including word processing, databases, reports, spreadsheets, multimedia presentations, electronic calendar, contacts, email, and internet applications. IT2.0
27.03 Employ computer operations applications to access, create, manage, integrate, and store information. IT3.0
27.04 Employ collaborative/groupware applications to facilitate group work. IT4.0

27.0 Describe the roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment--The students will be able to:

27.01 Describe the nature and types of business organizations. SY1.0
27.02 Explain the effect of key organizational systems on performance and quality.
27.03 List and describe quality control systems and/or practices common to the workplace. SY2.0
27.04 Explain the impact of the global economy on business organizations.

28.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance--The students will be able to:

28.01 Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments. SHE1.0
28.02 Explain emergency procedures to follow in response to workplace accidents.
28.03 Create a disaster and/or emergency response plan. SHE2.0

29.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives--The students will be able to:

29.01 Employ leadership skills to accomplish organizational goals and objectives. LT1.0
29.02 Establish and maintain effective working relationships with others in order to accomplish objectives and tasks. LT3.0
29.03 Conduct and participate in meetings to accomplish work tasks. LT4.0
29.04 Employ mentoring skills to inspire and teach others. LT5.0

30.0 Describe the importance of professional ethics and legal responsibilities--The students will be able to:

30.01 Evaluate and justify decisions based on ethical reasoning. ELR1.0
30.02 Evaluate alternative responses to workplace situations based on personal, professional, ethical, legal responsibilities, and employer policies. ELR1.1
30.03 Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace. ELR1.2
30.04 Interpret and explain written organizational policies and procedures. ELR2.0

31.0 Explain the importance of employability skill and entrepreneurship skills--The students will be able to:

31.01 Identify and demonstrate positive work behaviors needed to be employable. ECD1.0

31.02 Develop personal career plan that includes goals, objectives, and strategies. ECD2.0
31.03 Examine licensing, certification, and industry credentialing requirements. ECD3.0
31.04 Maintain a career portfolio to document knowledge, skills, and experience. ECD5.0
31.05 Evaluate and compare employment opportunities that match career goals. ECD6.0
31.06 Identify and exhibit traits for retaining employment. ECD7.0
31.07 Identify opportunities and research requirements for career advancement. ECD8.0
31.08 Research the benefits of ongoing professional development. ECD9.0
31.09 Examine and describe entrepreneurship opportunities as a career planning option. ECD10.0

32.0 Demonstrate personal money-management concepts, procedures, and strategies--The students will be able to:

32.01 Identify and describe the services and legal responsibilities of financial institutions. FL2.0
32.02 Describe the effect of money management on personal and career goals. FL3.0
32.03 Develop a personal budget and financial goals. FL3.1
32.04 Complete financial instruments for making deposits and withdrawals. FL3.2
32.05 Maintain financial records. FL3.3
32.06 Read and reconcile financial statements. FL3.4
32.07 Research, compare and contrast investment opportunities.

2012 - 2013

Florida Department of Education
Student Performance Standards

Course Title: **Water Quality Technology 3**
Course Number: **8916010**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas hydrology, geology principles, water treatment techniques, stormwater systems, water distribution, management of water resources, management of fisheries, drainage systems, 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.

33.0 Discuss hydrology--The student will be able to:

- 33.01 Identify alternative sources of water.
- 33.02 Identify soil conditions as they relate to water quality.
- 33.03 Research and explain saltwater intrusion.
- 33.04 Research governmental regulation authorities associate with Florida's water sources.
- 33.05 Identify limnology systems.

34.0 Conduct water sampling--The student will be able to:

- 34.01 Discuss water testing lab criteria.
- 34.02 Collect and analyze water samples: grab and otherwise.
- 34.03 Record data into identified database program.
- 34.04 Interpret lab results.
- 34.05 Evaluate data.
- 34.06 Measure well volumes.
- 34.07 Describe organism sampling techniques.

35.0 Discuss geology principles of water resources--The student will be able to:

- 35.01 Analyze local mineral resources.
- 35.02 Describe lithological descriptions of local units/formations.
- 35.03 Describe Florida aquifer system.
- 35.04 Perform aquifer performance tests.
- 35.05 Discuss basic groundwater chemistry.
- 35.06 Describe basic geographic techniques.
- 35.07 Describe local geology related problems.

36.0 Explain water treatment techniques--The student will be able to:

- 36.01 Describe drinking water treatments.
- 36.02 Identify water treatment recommendations for fish hatcheries.
- 36.03 Identify and describe the qualities water should possess for use in aquaculture.

36.04 Explain how changes in water affect aquatic life.
36.05 Explain, monitor, and maintain freshwater/salt water quality standards for the production of desirable species.
36.06 Calculate volume in circular, rectangular and irregular shaped water structures.
36.07 List and explain sources of aquaculture pollution and methods of preventing and/or correcting these pollution problems.

37.0 Discuss stormwater systems--The student will be able to:

37.01 Determine boundaries of watersheds.
37.02 Identify runoff coefficients.
37.03 Identify the relationship between construction sites and stormwater systems.
37.04 Research rules and regulations in regards to stormwater systems.
37.05 Contact local municipalities to determine stormwater regulations.

38.0 Describe water distribution--The student will be able to:

38.01 Identify backflow testing procedures.
38.02 Identify necessary equipment for water distribution purposes.
38.03 Read and maintain meters.
38.04 Identify maintenance requirements for fire hydrants, pipes, and valves.
38.05 Identify proper procedures for operation and maintenance of lift stations.

39.0 Demonstrate the management and environmentally sound use of water resources--The student will be able to:

39.01 Determine quality of groundwater and surface water.
39.02 Identify solids found in water.
39.03 Identify primary and secondary contaminants.
39.04 Identify unregulated organic compounds.

40.0 Manage fisheries--The student will be able to:

40.01 List and explain the meaning of morphology, anatomy and physiology in relation to Ichthyology.
40.02 List and describe the physiology of aquatic animals.
40.03 Identify and describe the basic structures and external anatomy of crustaceans.
40.04 Identify and describe the basic structure and internal anatomy of an oyster or a mussel.
40.05 Identify and describe the external and internal anatomy of fish.
40.06 Identify and describe the basic morphorology of aquatic macroalgae and mircoalgae.
40.07 Determine why aquatic crops may be more productive than terrestrial crops.
40.08 List and describe important characteristics in choosing a species.
40.09 Develop an information file in aquaculture species.
40.10 List and describe the major factors in the growth of aquatic fauna and flora.
40.11 Identify aquaculture/mariculture species of commercial importance in your area.

41.0 Maintain water treatment equipment and facilities--The student will be able to:

41.01 Research water treatment equipment and facility components.

41.02 Identify appropriate temperatures and other external conditions.
41.03 Identify the effect of weather conditions and changes.
41.04 Describe appropriate flow rates and tank levels.
41.05 Create a checklist and/or policies of necessary procedures to handle daily conditions, hazards and/or malfunctions.
41.06 Describe maintenance procedures and techniques of filters, pipes, generators, meters, motors, valves, instruments, injectors, storage basins etc.

42.0 Inspect and maintain drainage systems--The student will be able to:

42.01 Research Best Management Procedures.
42.02 Demonstrate proper ditch, pond, culvert, and manhole inspection techniques.
42.03 Demonstrate proper ditch, pond, culvert, and manhole maintenance techniques
42.04 Develop storm cleanup and prevention plan.
42.05 Recognize pollutants, illegal dumping and discharge and demonstrate appropriate handling procedures.
42.06 Clean outfall structures, inlets, and treatment systems.
42.07 Demonstrate the procedures to clean and televise pipes.
42.08 Mow ditch banks and right of ways.
42.09 Maintain, repair and replace pipe sections.

43.0 Describe the nature and origin of and career opportunities in aquaculture, mariculture and other hydrological industries--The students will be able to:

43.01 Identify related associated professional associations.
43.02 List and describe the nature of five areas of aquaculture occupations.
43.03 List and describe the careers associated with water treatment, distribution, and management.
43.04 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations

2012 - 2013

Florida Department of Education
Student Performance Standards

Course Title: **Water Quality Technology 4**
Course Number: **8916020**
Course Credit: **1**

Course Description:

This course is designed to develop competencies in the areas water treatment techniques, stormwater systems, water distribution, management of water resources, management of fisheries, 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.

44.0 Identify career opportunities and organizational dynamics in water resources--The student will be able to:

- 44.01 Research and create a presentation about aquaculture occupations and opportunities.
- 44.02 Research and create a presentation about mariculture occupations and opportunities.
- 44.03 Determine the educational requirements and experience needed to enter and advance in aquaculture/mariculture occupations.
- 44.04 Prepare a resume.

45.0 Demonstrate water treatment techniques--The student will be able to:

- 45.01 Determine soil types, land slope, and other factors to consider in choosing a location for a manmade pond or other aquaculture operation.
- 45.02 Identify/explain environmentally safe methods of aquaculture wastewater disposal.
- 45.03 Identify and consult agencies regulating water quality standards in order to prevent compliance problems.
- 45.04 Observe different stages of construction of ponds and/or other aquaculture production facilities.

40.0 Manage fisheries--The student will be able to:

- 40.12 Use dichotomous keys to identify fish and other aquatic species.
- 40.13 Discuss disease and parasites related to fish and other aquatic plants and animals.
- 40.14 Discuss habitat improvement for aquatic animals.
- 40.15 Identify aquaculture and mariculture practices.
- 40.16 Identify hatchery management.
- 40.17 Identify monitoring practices.
- 40.18 Discuss harvesting techniques.
- 40.19 Describe population dynamics.
- 40.20 Describe fisheries and marine resources and regulations.

40.21 Design an aquaculture/mariculture system
40.22 Conduct statistical analysis.
40.23 Interpret related data.

46.0 Compliance monitoring/inspection--The student will be able to:

46.01 Trace lines.
46.02 Survey business and industry.
46.03 Conduct pretreatment sampling.
46.04 Analyze data and document reports.
46.05 Design monitoring plan.
46.06 Monitor sites.

47.0 Discuss comprehensive quality assurance plan--The student will be able to:

47.01 Discuss quality assurance rules.
47.02 Write of follow standard operating procedures.
47.03 Describe preventative maintenance techniques.
47.04 Describe cleaning/decontamination techniques.
47.05 Determine accuracy and precision of sampling techniques.
47.06 Discuss need for corrective action.
47.07 Document Quality Assurance.