

Agriculture, Food and Natural Resources: Environmental Service Systems

Career Pathway Plan of Study for ► Learners ► Parents ► Counselors ► Teachers/Faculty

This Career Pathway Plan of Study (based on the Environmental Service Systems Pathway of the Agriculture, Food and Natural Resources Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. *This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/or Degree Major Courses for Environmental Service Systems Pathway	SAMPLE Occupations Relating to This Pathway
Interest Inventory Administered and Plan of Study Initiated for all Learners								
SECONDARY	9	English/ Language Arts I	Algebra I	Earth or Environmental Science	State History Civics	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Supervised Agricultural Experience (SAE) and participation in appropriate FFA activities support and reinforce classroom and laboratory learning and should be a requirement for all students.	• Introduction to Agriculture, Food and Natural Resources	Occupations Requiring Postsecondary Education ▶ Environmental Compliance-Assurance Manager ▶ Environmental Sampling and Analysis Scientist/Technician ▶ Hazardous Materials Handler ▶ Hazardous Materials Technician ▶ Health and Safety Sanitarian ▶ Pollution Prevention and Control Technician ▶ Recycler ▶ Solid Waste Technician
	10	English/ Language Arts II	Geometry	Biology	U.S. History		• Introduction to Environmental Service Systems	
	11	English/ Language Arts III	Algebra II or other math course	Chemistry or other science course	World History		• Power Systems	
	College Placement Assessments-Academic/Career Advisement Provided							
	12	English/ Language Arts IV	Trigonometry or other math course	Physics or other science course			• Research in Natural Resources and Biotechnology • Internship in Environmental Service Systems	
Articulation/Dual Credit Transcribed-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.								
POSTSECONDARY	Year 13	English Composition	Algebra	Chemistry	American Government	All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	• Environmental Systems • Soil and Water in the Environment	Occupations Requiring Baccalaureate Degree ▶ Agricultural Educator ▶ Chemical Engineer ▶ Environmental Engineer ▶ Pollution Prevention and Control Manager ▶ Solid Waste Manager ▶ Toxicologist ▶ Water Environment Manager ▶ Water Quality Manager
	Year 14	Speech/ Oral Communication	Calculus	Biological Science Botany	American History Geography		• Environmental Service Systems Operations • Surveying and Mapping the Environment	
	Year 15	Technical Writing	Statistics	Organic Chemistry Microbiology	Political Science		• Continue Courses in the Area of Specialization	
	Year 16	Continue courses in the area of specialization.					• Complete Environmental Service Systems Major (4-Year Program)	

Creating Your Institution's Own Instructional Plan of Study

With a team of partners (secondary/postsecondary teachers and faculty, counselors, business/industry representatives, instructional leaders, and administrators), use the following steps to develop your own scope and sequence of career and technical courses as well as degree major courses for your institution's plan of study.

- 1** Crosswalk the Cluster Foundation Knowledge and Skills (available at <http://www.careerclusters.org/goto.cfm?id=82>) to the content of your existing secondary and postsecondary programs/courses.
- 2** Crosswalk the Pathway Knowledge and Skills (available at <http://www.careerclusters.org/goto.cfm?id=6>) to the content of your existing secondary/postsecondary programs and courses.
- 3** Based on the crosswalks in steps 1 and 2, determine which existing programs/courses would adequately align to (cover) the knowledge and skills. These programs/courses would be revised to tighten up any alignment weaknesses and would become a part of a sequence of courses to address this pathway.
- 4** Based on the crosswalks in steps 1 and 2, determine what new courses need to be added to address any alignment weaknesses.
- 5** Sequence the **content** and **learner outcomes** of the existing programs/courses identified in step 3 and new courses identified in step 4 into a course sequence leading to preparation for all occupations within this pathway. (See list of occupations on page 1 of this document.)
- 6** The goal of this process would be a series of courses and their descriptions. The names of these courses would be inserted into the *Career and Technical Courses* column on the Plan of Study on page 1 of this document.
- 7** The SAMPLE on page 4 is a **sample result** of steps 1-6, and these course titles are inserted into the Plan of Study on page 1 of this document.
- 8** Crosswalk your state academic standards and applicable national standards (e.g., for mathematics, science, history, language arts, etc.) to the sequence of courses formulated in step 6.

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SAMPLE Sequence of Courses for ► Instructional Leaders ► Administrators ► Counselors ► Teachers/Faculty

SAMPLE

Below are suggested courses that could result from steps 1-6 above. However, as an educational institution, course titles, descriptions and the sequence will be your own. This is a good model of courses for you to use as an example and to help you jump-start your process. Course content may be taught as concepts within other courses, or as modules or units of instruction.

The following course is based on the Cluster Foundation Knowledge and Skills found at <http://www.careerclusters.org/goto.cfm?id=82>. These skills are reinforced through Supervised Agricultural Experience (SAE) programs including entrepreneurial, work-based, research or service learning. Skills are also reinforced and the SAE supported through participation in appropriate FFA activities.

#1

Introduction to Agriculture, Food and Natural Resources: This is a core course for the Agriculture, Food and Natural Resources Career Cluster that builds a knowledge base and technical skills in all aspects of the industry. Learners will be exposed to a broad range of agriculture, food and natural resources careers and Cluster Foundation Knowledge and Skills. This may be taught as a career exploration course in conjunction with other foundation Career Cluster courses.

The following course is based on the Cluster Foundation Knowledge and Skills as well as the Pathway Knowledge and Skills found at <http://www.careerclusters.org/goto.cfm?id=6>. These skills are reinforced through participation in FFA.

#2

Introduction to Environmental Service Systems: This course provides an introduction to environmental studies including renewable and non-renewable natural resources, history of the environment, personal development, water and air quality and relevant regulations, waste management, land use regulations, soils and meteorology. Students will study effective management practices, methods of environmental monitoring and conservation, sampling methodologies and conservation techniques.

The following courses expose students to Pathway Knowledge and Skills found at <http://www.careerclusters.org/goto.cfm?id=6> and should include an appropriate Supervised Agricultural Experience (SAE) and FFA activities that support classroom/laboratory and SAE learnings.

#3

Power Systems: This course builds on the principles of the previous course and provides more in-depth knowledge and skills as they relate to energy sources, lubricants, service and maintenance of machinery and equipment, and equipment operation. Students will apply principles of service and repair by troubleshooting problems and evaluating engine performance as well as follow guidelines to service and repair power transmission systems, hydraulic systems, electrical systems, heating and air conditioning systems, steering, suspension, traction and vehicle performance systems. Tools used with these procedures will allow students to demonstrate proper skill and safety.

#4

Research in Natural Resources and Biotechnology: This course provides instruction in the technologically advanced world of natural resources and environmental sciences. Students are introduced to the latest techniques and advances in natural resources systems, methods of environmental monitoring and conservation, air and water regulations, sampling methodologies, and prescribing conservation with a strong emphasis on hands-on activities and research experiments in biotechnology.

#5

Internship in Environmental Service Systems: This course provides work-site learning experiences in a career related to environmental service systems. Students have the opportunity to practice specific skills, including record keeping, and receive credit for time spent in the workplace.

#6

Environmental Systems: Students will use analysis procedures, instruments and graphs to plan and evaluate environmental service impacts. Content also includes identification of public policies and regulations impacting environmental service systems.

#7

Soil and Water in the Environment: This course includes scientific principles related to environmental sciences including weather systems, soil, ground water and the wetlands. Students will use chemical analysis procedures to conduct tests, perform common microbiology procedures and apply appropriate sampling techniques.

#8

Environmental Service Systems Operations: Students will demonstrate knowledge and procedures for safe operation of environmental service systems including hazard materials management, pollution control, water treatment, waste water treatment, solid waste management and energy.

#9

Surveying and Mapping the Environment: Students will use tools, equipment, machinery and technology to accomplish tasks in environmental services. Content will include basic drafting, use of surveying, mapping and other technological tools such as GIS/GPS to map land, facilities and infrastructure.

