Agriculture, Food and Natural Resources

Pathway: Environmental Service Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPF01.01	Environmental Service Systems	#2: Introduction to Environmental Service Systems #4: Research in Natural Resources and Biotechnology #6: Environmental Systems	Use analysis procedures to plan and evaluate environmental service impacts.	Use instrumentation to monitor samples.	Operate basic laboratory equipment and environment monitoring instruments (e.g., pH meter/ISE meter, compound microscope/dissecting microscope, sound level measuring devices, turbidimeter, conductivity meter, chlorine meter OVA, HNMU).
					Perform chemical laboratory sample preparation.
					Perform analytical separation techniques.
					Perform spectroscopic analysis using instruments such as spectrophotometer/ auto spectrophotometer, AA/graphite furnace, ICP, GC/MS, oxygen meter, IC, IR, FTIR X-ray diffraction nitrogen analyzer, mercury analyzer, FID/PID analyzer, and RAD meter.
					Operate advanced laboratory and field equipment and instruments (e.g., HPLC, GC, bomb calorimeter, geiger mueller counter, explosimeters specific gas meters, carbon analyzer, microwave).
					Use computers to interface with chemical analytical instruments.
					Perform instrumental analysis (e.g., mass spectrometers, chromatographs, electron microscopes).

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			(CONTINUED)	Calibrate and service instruments on a timely schedule to maintain environmental instrumentation.	Maintain instruments using gas systems.
					Calibrate chemical analytical instruments.
					Operate and maintain flow instrument systems.
					Operate and maintain pressure test instruments (e.g., manometers, vacuum pumps, pressure and vacuum gages).
					Service thermal measuring instruments.
					Service physical property (e.g., sample control) measuring instruments.
					Service chemical property measuring instruments (e.g., O2 meter, spectrophotometer, atomic absorption spectrophotometer, inductively coupled plasma, ion chromatography, infrared).
				Apply statistics, charts, and scattergrams to measure and monitor operations.	Apply basic statistics concepts.
					Interpret scattergrams.
					Analyze probability theories.
					Determine control limits.
					Determine process capability.
					Prepare and evaluate charts.
					Conduct process improvement studies.
					Interpret quantitative and graphic output from chemical analysis instruments.

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AGPF01.02	Environmental Service Systems	#6: Environmental Systems	Identify public policies and regulations impacting environmental services to determine their effect on facility operation.	Consult reliable resources or training to identify the major laws impacting environmental services.	Identify key components of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
					Identify requirements of Superfund Amendment Reauthorization Act (SARA).
					Identify requirements of waste and material transportation.
					Describe job-related activities subject to the Occupational Safety and Health Administration (OSHA).
					Describe requirements of Resource Conservation and Recovery Act (RCRA).
					Explain requirements of Clean Water Act.
					Explain requirements of Safe Drinking Water Act (SDWA).
					Explain requirements of Clean Air Act.
					Identify requirements of the Nuclear Waste Policy Act.
					Identify key components of (_____)ISO 14000.
AGPF01.03	Environmental Service Systems	#7: Soil and Water in the Environment	Apply scientific principles to environmental services.	Apply meteorological knowledge to recognize weather systems and weather patterns.	Identify the components of the earth's atmosphere.
					Explain basic meteorology principles.
				Describe soil compositions and properties to demonstrate knowledge of soil science.	Describe soil geology.
					Describe composition of soil.
					Describe the biological properties of soil.
					Identify the physical properties of soil.
					Describe the chemical properties of soil.
					Test soil samples to determine characteristics.
					Explain classification of soil water.
					Explain the relationship between soil classifications and land use.

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			(CONTINUED)	Explain well design and groundwater supplies to demonstrate knowledge of hydrology.	Explain hydrology.
					Explain geological and meteorological principles affecting groundwater supply.
					Conduct channel flow analysis.
					Identify basic criteria for water well design.
					Identify differences in groundwater potential.
					Identify environmental hazards associated with groundwater supplies.
				Discuss properties, classifications and functions in order to understand wetland principles.	Explain wetlands classification.
					Explain the function of wetlands.
					Describe the living components of wetland habitats.
					Delineate wetlands.
					Identify techniques used in wetland management, enhancement and restoration programs.
					Identify principles used in wetland mitigation and restoration.
				Discuss properties, classifications and functions in order to understand watershed principles.	Identify properties of watersheds.
					Explain watershed management.
					Delineate watersheds.
					Assess source water.
				Use chemical analysis to conduct tests.	Explain basic chemistry principles (e.g., elements, compounds).
					Apply chemical laboratory skills.
				Perform common microbiology procedures to examine cell types and conduct tests.	Conduct bioassay tests.
					Identify groups of microorganisms.
					Analyze factors affecting microbial growth.
				Apply sampling techniques and other assessments to demonstrate background knowledge of microbiology.	Apply microbiological principles and procedures.
					Explain immunological procedures.
					Describe roles of microorganisms in the environment.
					Explain microbial growth.
					Describe influence of environmental factors on microbes.
					Demonstrate the use of fundamental statistics in sampling practices.

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AGPF01.04	Environmental Service Systems	#8: Environmental Service Systems Operations	Operate environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management, and energy) to manage a facility environment.	Use pollution control measures to maintain a safe facility environment.	Identify types of pollution (e.g., ground, surface water, air, noise, radioactive contamination).
					Identify presence of pollution.
					Describe environmental impact from industrial and non-industrial processes.
					Quantify extent of pollution.
					Locate and monitor sources of pollution.
					Conduct remediation activities.
					Monitor remediation activities.
					Establish pollution management and prevention program.
				Apply principles of solid waste management (landfill) to manage safe disposal of all categories of waste.	Collect solid waste materials.
					Treat solid waste materials.
					Manage solid waste systems.
					Identify characteristics of solid waste treatment.
					Identify the risks associated with solid waste accumulation and disposal.
					Describe methods of site identification and acceptance.
					Explain sanitary landfill operating procedures.
					Monitor sanitary landfill procedures.
					Describe methods to operate a composting facility.
					Describe methods to incinerate solid waste.
					Describe recycling methods.

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			(CONTINUED)	Apply drinking water treatment operations principles to assure safe water at a facility.	Identify characteristics of drinking water treatment.
					Explain the aeration process in water treatment.
					Monitor the mixing, coagulation and flocculation processes in water treatment.
					Monitor the filtration and sedimentation process in water treatment.
					Monitor the water-softening process in water treatment.
					Monitor the stabilization process in water treatment.
					Monitor the corrosion-control process in water treatment.
					Monitor the disinfection process in water treatment.
					Monitor the iron and manganese removal processes in water treatment.
					Describe taste and odor control in water treatment.
					Describe the demineralization processes in water treatment.
					Monitor the fluoridation process in water treatment.
					Identify facility operational problems in water treatment.
					Identify methods for backflow prevention.

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			(CONTINUED)	Apply wastewater treatment operations principles to manage wastewater disposal in keeping with rules and regulations.	Identify characteristics of wastewater treatment.
					Sample wastewater.
					Describe wastewater collection systems.
					Analyze the constituents of wastewater entering wastewater treatment facility.
					Describe the mixing, coagulation and flocculation processes in wastewater treatment.
					Describe the disinfection process in wastewater treatment.
					Describe the treatment train, effluent disposal, and biosolids management in wastewater.
					Analyze process optimization for the treatment train, effluent disposal, and biosolids management in wastewater treatment.
					Analyze treatment process control for the treatment train, effluent disposal, and biosolids management in wastewater.
					Inspect and maintain equipment for the treatment train, effluent disposal, and biosolids management in wastewater.
					Describe common facility operational problems.
					Identify methods for cross-connection and backflow prevention.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Apply hazardous materials management principles to assure a safe facility and to comply with applicable regulations.	Describe risks related to hazardous materials.
					Describe health and safety practices to reduce risks from hazardous materials.
					Demonstrate appropriate responses for major types of hazardous materials disasters (e.g., chemical, fire and explosion, general safety hazards) (FRA, FRO, HMT, HMS).
					Describe appropriate use of Personal Protective Equipment (PPE).
					Explain hazardous substance regulations.
					Demonstrate ability to obtain and use information addressing hazardous substance release.
					Demonstrate safe handling procedures for hazardous materials and hazardous waste.
					Evaluate laboratory results.
					Demonstrate methods for identifying hazardous material.
					Detect hazardous materials.
					Perform site evaluation for hazardous material risk.
					Retrieve and evaluate hazardous materials and hazardous waste sample data.
					Respond to mock hazardous materials emergency situations.
					Describe use of equipment related to hazardous materials and hazardous-waste operations.
					Prepare hazardous materials for transportation and storage in accordance with regulations.
					Demonstrate ability to operate treatment and disposal systems for hazardous materials and hazardous waste.
					Maintain required documents for hazardous-materials and hazardous-waste management activities.
					Audit regulatory compliance.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Explore conventional and alternative supplies to define energy sources.	Identify conventional energy sources and their environmental impact.
					Identify alternate energy sources and their environmental impact.
AGPF01.05	Environmental Service Systems	#3: Power Systems #5: Internship in Environmental Service Systems #9: Surveying and Mapping the Environment	Use tools, equipment, machinery and technology to accomplish tasks in environmental services.	Use technological tools to map land, facilities, and infrastructure.	Apply surveying and mapping principles to make site measurements and map facility accesses and infrastructure.
					Apply basic drafting skills to create working drawings.
					Use CADD fundamentals to create specialized documents.
					Apply cartographic skills.
					Apply surveying skills.
					Use geo-spatial analysis processes for an environmental services application.