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).

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(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.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
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.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(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.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
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.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(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.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(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.

Agriculture, Food and Natural Resources

Pathway: Plant Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPB01.01	Plant Systems	#8: Principles of Plant Systems #4: Biotechnology and Agricultural Science Research	Apply principles of anatomy and physiology to produce and manage plants in both a domesticated and a natural environment.	Analyze and evaluate nutritional requirements and environmental conditions to develop and implement a fertilization plan.	Describe nutrient sources.
					Determine plant nutrient requirements for optimum growth.
					Identify function of plant nutrients in plants.
					Determine the environmental factors that influence and optimize plant growth.
					Apply nutrients to plants for economic growth.
					Describe nutrient application methods and appropriate practices.
		Course content of this K&S also reflected in the following courses of specialization: #5: Horticulture #6: Forestry and Range Science #7: Agronomy	.	Test appropriate materials or examine data to evaluate and manage soil/media nutrients.	Collect and test soil/media and/or plant tissue.
					Interpret tests of soil/media and/or plant tissue.
					Identify soil slope, structure and type.
					Evaluate soil/media permeability and water-holding capacity.
					Determine the chemical properties of soil/media.
					Determine land use capability.
					Determine the biological functions of microorganisms of soil/media.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Explain and use basic methods for reproducing and propagating plants.	Determine the role of genetics in plants.
					Describe the components and functions of plant reproductive parts.
					Identify and practice methods of asexual/sexual plant propagation.
					Describe the principles of plant micro-propagation.
					Apply principles and practices of biotechnology to plant propagation.
				Develop and use a plan for integrated pest management.	Identify plant pests (e.g., insects, diseases, weeds, rodents).
					Determine pest management safety practices.
					Determine pest management methods.
					Develop pest management plans based on pest life cycles.
					Implement pest control plan with appropriate treatments.
					Evaluate pest control plan.
					Prevent, identify and manage pest resistance.
AGPB01.02	Plant Systems	#8: Principles of Plant Systems	Address taxonomic or other classifications to explain basic plant anatomy and physiology.	Examine unique plant properties to identify/describe functional differences in plant structures including roots, stems, flowers, leaves and fruit.	Identify plant structures (e.g., seeds).
					Describe physiological functions of plants.
					Describe germination process and conditions.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Classify plants based on physiology for taxonomic or other classifications.	Classify plants as monocots or dicots.
					Classify plants as annuals, biennials or perennials.
					Classify plants according to growth habit.
					Classify plants by type.
					Classify plants by economic value.
AGPB01.03	Plant Systems	#9: Fundamentals of Plant Production and Management	Apply fundamentals of production and harvesting to produce plants.	Apply fundamentals of plant management to develop a production plan.	Identify and select seeds and plants.
					Manipulate and evaluate environmental conditions (e.g., irrigation, mulch, shading) to foster plant germination, growth and development.
					Evaluate and demonstrate planting practices (e.g., population rate, germination/seed vigor, inoculation, seed and plant treatments).
					Evaluate and demonstrate transplanting practices.
					Prepare soil/media for planting.
					Control plant growth (e.g., pruning, pinching, disbudding, topping, detasseling, staking, cabling, shearing, shaping).
					Prepare plants and plant products for distribution.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Apply fundamentals of plant management to harvest, handle and store crops.	Determine crop maturity.
					Identify harvesting practices and equipment.
					Demonstrate common harvesting techniques.
					Calculate yield and loss.
					Identify options for crop storage.
					Maintain quality of plant products in storage.
					Prepare plants and plant products for distribution.
AGPB01.04	Plant Systems	#2: Introduction to Plant and Soil Science #3: Advanced Plant and Soil Science	Exercise elements of design to enhance an environment (e.g., floral, forest, landscape, farm).	Apply basic design elements and principles to create a design using plants.	Conduct a site evaluation for physical condition and design implications.
					Apply elements of design (e.g., line, form, texture, color).
					Incorporate principles of design (e.g., space, scale, proportion, order).
					Use landscape design drawing tools including Computer Aided Design (CAD) and industry-specific software.
					Select hard goods, supplies and tools used in design.
					Select plant(s) for design.

Agriculture, Food and Natural Resources

Pathway: Power, Structural & Technical Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD01.01	Science	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems #5: Internship in Power, Structural and Technical Systems #6: Power, Structural and Techinical Systems	Apply physical science principles to engineering applications with mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Relate power generation to energy sources.	Identify petroleum sources (e.g., gasoline, diesel).
					Identify alternative sources (e.g., ethanol, biodiesel, air, wood, geothermal, solar).
					Compare environmental impact of energy sources.
					Compare efficiency of energy source.
					Compare characteristics of energy sources.
					Discuss efficiency of systems (e.g., fuel cells, chemical, wind, hydro, nuclear, electric, mechanical, solar, biological).
				Apply principles of lubricants to sort and classify lubricants.	Classify lubricants and determine applications.
					Identify viscosity and strengths of lubricants.
					Describe properties of lubricants.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD02.01	Power	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems	Apply principles of operation and maintenance to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Perform scheduled service routines to maintain machinery and equipment.	Lubricate machinery and equipment.
					Ensure presence and function of safety systems and hardware.
					Service electrical systems.
					Perform machine adjustments (e.g., belts, drive chains).
					Service filtration systems.
					Maintain fluid levels.
					Maintain vehicle, machinery and equipment cleanliness and appearance.
					Maintain fluid conveyance components, (e.g., hoses and lines, valves, nozzles).
					Design a preventive maintenance schedule.
					Identify causes of malfunctions and failures.
					Calibrate metering, monitoring, and sensing equipment.
				Observe rules of the road to operate machinery and equipment.	Describe function of machine controls and instrumentation.
					Perform appropriate start-up procedures.
					Select proper machine(s) for specific task(s).
					Safely operate equipment.
					Perform pre-operation inspection.
					List applicable laws for on- and off-highway operation.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD02.02	Power	#2: Introduction to Power, Structural and Technical Systems #4: Power Systems	Apply principles of service and repair to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.	Troubleshoot problems and evaluate performance to service and repair the components of internal combustion engines.	Describe principles of operation.
					Identify engine systems and components.
					Analyze and troubleshoot engine.
					Perform overhaul procedures.
					Evaluate engine performance through post-rebuild testing.
				Follow manufacturers' guidelines to service and repair power transmission systems.	Describe features, benefits, and applications of various power transmission systems.
					Describe principles of operation of various power transmission systems.
					Perform calculations involving speed, torque and power relationships.
					Describe features, benefits, and applications of mechanical transmission components (e.g., belts, chains, gears, bearings, seals, universals).
					Inspect, analyze, and repair hydrostatic transmissions.
					Inspect, analyze, and repair differentials and final drives.
					Inspect, analyze, and repair clutches and brakes.
					Inspect, analyze, and repair gear-type transmissions including power shift.
					Inspect, analyze, and repair auxiliary drives.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Evaluate performance and check maintenance manuals to service and repair hydraulic systems.	Describe features, benefits, and applications of types of hydraulic systems.
					Describe physical principles of operation.
					Interpret symbols and schematic drawings.
					Describe the application and operation of major components.
					Inspect, analyze, and repair hydraulic components (e.g., pumps, valves).
					Inspect, analyze, and repair fluid conveyance components (e.g., hoses, lines).
					Evaluate system cleanliness.
					Identify hydraulic fittings and ports.
				Troubleshoot from schematics to service vehicle electrical systems.	Describe features and applications of electrical systems.
					Interpret symbols and wiring diagrams.
					Test and troubleshoot electrical systems and components (e.g., battery, charging, starting, lighting, instrumentation, accessories).
					Troubleshoot and install instrumentation and data acquisition system (e.g., Global Positioning System (GPS), spraying, planting, harvesting monitors).
					Diagnose and repair control systems and sensors (e.g., engine, transmission, implement).

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Use company diagrams and schematics to service vehicle heating and air conditioning systems.	Describe physical principles of operation.
					Interpret symbols and diagrams.
					Test, troubleshoot, and replace heating and air-conditioning components (e.g., compressor, expansion valve, receiver dryer, pump, hoses).
					Evacuate and charge air conditioning systems.
				Check performance parameters to service and repair steering, suspension, traction, and vehicle performance systems.	Evaluate traction, ballasting, and weight transfer.
					Evaluate vehicle stability.
					Determine optimum vehicle performance, e.g., horsepower management, fuel efficiency.
					Troubleshoot, adjust, and repair suspension systems.
					Inspect and repair steering systems.
				Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.	Demonstrate proper use of measurement and layout tools.
					Apply proper use of measurement and layout tools in construction/fabrication of an actual project.
					Demonstrate safe and proper techniques in using hand and power tools in construction/fabrication.
					Demonstrate hand and power tool use to construct/fabricate an actual project according to blueprints or plans.
					Identify and demonstrate proper hand and power tool maintenance procedures.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD03.01	Structural Systems	#3: Structural Systems	Exercise basic skills in blueprint and design development to create sketches, drawings and plans.	Use computer skills to develop simple sketches and plans.	Use current technology to develop simple plans and sketches.
					Identify symbols and drawing techniques used to develop simple plans and sketches.
					Use scale measurement and dimension to develop simple plans and sketches.
AGPD03.02	Structural Systems	#3: Structural Systems	Read and relate structural plans to specifications and building codes.	Examine blueprints and local codes to develop a logical construction plan.	Identify parts of a plan or blueprint.
					Identify criteria for different views of a plan or blueprint.
					Locate elements of a construction plan and develop a construction plan.
					Identify local code enforcement agencies and procedures.
					Read and interpret local code information.
					Complete permit applications.
AGPD03.03	Structural Systems	#3: Structural Systems	Examine structural requirements to estimate project costs.	Use bids and billing information to develop a complete materials list and project cost estimate.	Identify materials used in agricultural construction/fabrication.
					Explain proper criteria for material use.
					Identify elements of project cost estimate (materials, labor, administrative, etc.).
					Explain selection process of all construction materials.
					Estimate and select type and quantities of material and other costs associated with a specified project plan.
					Prepare a bid package for a planned project.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPD03.04	Structural Systems	#3: Structural Systems	Develop skills required to use construction/ fabrication equipment and tools.	Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.	Demonstrate proper use of measurement and layout tools.
					Apply proper use of measurement and layout tools in construction/fabrication of an actual project.
					Demonstrate safe and proper techniques in using hand and power tools in construction/fabrication.
					Demonstrate hand and power tool use to construct/fabricate an actual project according to blueprints or plans.
					Identify and demonstrate proper hand and power tool maintenance procedures.
AGPD03.05	Structural Systems	#3: Structural Systems	Plan, implement, manage, and/or provide support services to facility design and construction; equipment design, manufacture, repair, and service; and agricultural technology.	Design machinery and equipment including vehicles, implements, building, and facilities (e.g., feeding, feed storage).	Analyze site/equipment/permit requirements.
					Develop drawings.
					Estimate material needs and costs.
					Operate Computer Aided Drafting Design (CADD) Software.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Follow architectural and mechanical plans to construct buildings and facilities.	Identify and select appropriate building materials.
					Install plumbing equipment and fixtures.
					Construct with wood and metal.
					Install electrical wiring components and fixtures.
					Paint or protect with coatings.
					Insulate facility.
					Install fencing.
					Install glass, ridged plastic panels and/or film plastic.
					Construct with concrete, stone, and brick.
AGPD04.01	Technical Systems	#8: Advanced Applications of Technical Systems	Use the variety of tools available in computer systems to accomplish fast, accurate production in the workplace.	Identify and explain various types of hardware systems to show their applications potential.	Identify and describe individual components of each system.
					Discuss various types of diagnostic equipment.
					Be able to show aptitude in use of various equipment.
					Demonstrate competency on cable through put and set up.
AGPD04.02	Technical Systems	#7: Technical Systems	Use available power sources to plan and apply control systems.	Measure with selected instruments to demonstrate knowledge of basic electricity.	Show proficiency in use of various meters.
					Discuss importance of and techniques for grounding.
					Show understanding of codes and regulations.
					Discuss various energy sources.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Reference electrical drawings to design, install, and troubleshoot control systems.	Develop and read schematic drawings for a control system.
					Identify and describe uses of various components of control systems; i.e., transistors, relays, HVAC, logic controllers.
					Discuss the importance of maintenance schedules.
					Identify system performance problems and apply troubleshooting techniques.
AGPD04.03	Technical Systems	#8: Advanced Applications of Technical Systems	Explain geospatial technology to demonstrate its applications.	Employ appropriate techniques to demonstrate application of GIS/GPS systems principles.	Explain the concept and principles.
					Describe equipment.
					List techniques used.
					Explain the application of GIS/GPS systems with map development output.
				Use computer applications to produce maps that reflect surveying and mapping principles.	Understand and use various equipment.
					Perform survey and produce map using computer techniques.
				Select an area of personal expertise to demonstrate knowledge of end applications.	Apply knowledge and experience to a specific application or project to show competency; i.e., calibration, volumetric controlling, electrical design.

Agriculture, Food and Natural Resources

Pathway: Natural Resource Systems

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPE01.01	Natural Resource Systems	#2: Introduction to Natural Resources and the Environment #5: Internship in Natural Resources #6: Management of Natural Resource Systems	Recognize importance of resource and human interrelations to conduct management activities in natural habitats.	Identify resource management components to establish relationships in natural resource systems.	Identify natural resources.
					Identify organizations and agencies involved in resource management.
					Identify impacts by humans on natural resources.
					Describe ecosystem relationships.
					Create habitat management plan.
				Apply cartographic skills to natural resource activities.	Describe different types of maps.
					Interpret map features and legend.
					Determine map scale and actual distance.
					Determine direction from map.
					Determine elevation and terrain features from topographic maps.
					Use directional tools with map to locate position.
					Use land survey and coordinate system.
					Use Geographic Information System to interface geospatial data.
					Interpret photos and images.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Monitor natural resource status to obtain planning data.	Conduct resource inventory and population studies.
					Establish sample plots and points.
					Locate and identify resources.
					Collect data concerning resource availability and health.
					Maintain databases of resource data.
					Use a Geographic Information System to analyze resource data.
					Prepare a technical report.
					Describe the relationship of harvest levels to long-term availability of resources.
				Employ environmental and wildlife knowledge to demonstrate natural resource enhancement techniques.	Demonstrate stream enhancement techniques.
					Demonstrate forest stand improvement techniques.
					Demonstrate wildlife habitat enhancement techniques.
					Demonstrate range enhancement techniques.
					Demonstrate recreation area enhancement techniques.
				Examine weather and other criteria to recognize dangers related to work in an outdoor environment.	Recognize weather-related dangers.
					Recognize hazards as they relate to terrain.
					Recognize poisonous plants and animals.
					Recognize hazardous situations at the work location.
				Learn applicable rules or laws to demonstrate natural resource mitigation techniques.	Demonstrate mitigation techniques.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPE01.02	Natural Resource Systems	#5: Internship in Natural Resources #7: Principles of Natural Resource Conservation	Use effective venues to communicate natural phenomena to the public.	Communicate natural resource information to the general public.	Set up and staff a display booth that communicates a natural resource topic during a community event.
					Develop a public use area to explain natural resources.
					Participate as a facilitator during a public meeting concerning natural resource management.
					Lead a group habitat conservation project.
					Volunteer in a natural resource area.
				Personally interpret natural resource phenomena to natural resource users.	Lead a group hike to interpret a natural area.
					Conduct a workshop, activity or program to interpret an example of natural resource conservation.
					Develop an interpretive trail to describe a natural resource area.
					Produce printed material that interprets a natural resource area or phenomenon.
					Produce natural resource curriculum
					Develop a sign to communicate a natural resource area or phenomenon.
					Create a multi-media/video presentation that interprets a natural resource topic, area or phenomenon.
					Create a web page to present and interpret a natural resource topic, area or phenomenon.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPE01.03	Natural Resource Systems	#3: Advanced Natural Resources and Environmental Systems #4: Research in Natural Resources and Biotechnology	Apply scientific principles to natural resource management activities.	Use science concepts, processes, and research techniques to examine natural resource topics.	Develop a research/monitoring plan to inquire about a natural resource topic.
					Conduct a research/monitoring activity for a natural resource topic.
					Evaluate the results of a natural resource-related inquiry.
					Produce a technical report of results/findings.
				Examine biological and physical characteristics to identify and classify natural resources.	Identify tree species and other woody vegetation.
					Identify grass and forb species.
					Identify wildlife species.
					Identify fish species.
					Identify rocks, minerals and soil types.
				Examine natural cycles and related phenomena to describe ecologic concepts and principles.	Describe the hydrologic cycle.
					Describe the nitrogen cycle.
					Describe the carbon cycle.
					Describe nutrient cycles.
					Describe succession.
					Describe population dynamics.
					Describe primary and secondary producers.
					Describe predator-prey relationships.
					Identify potential pollution sources.
					Define watershed boundaries.
					Use stream classification system.
					Describe the influence of weather and climatic factors.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
AGPE01.04	Natural Resource Systems	#6: Management of Natural Resource Systems	Employ knowledge of natural resource industries to describe production practices and processing procedures.	Prepare presentations to describe how natural resource products are produced, harvested, processed and used.	Describe forest harvest techniques and procedures.
					Describe wildlife harvest techniques and procedures.
					Describe fish harvest techniques and procedures.
					Describe how minerals and ores are extracted and processed.
					Describe how oil is extracted and processed.
					Describe hydroelectric generation techniques and procedures.
					Describe how public recreation use is a product.
AGPE01.05	Natural Resource Systems	#8: Protecting Natural Resources #9: Disease Management	Practice responsible conduct to protect natural resources.	Employ techniques and equipment needed to prevent wildfire.	Demonstrate personal fire prevention precautions while working in natural environments.
					Participate in wildfire prevention community service project.
				Use wildfire suppression techniques to demonstrate abilities in firefighting and control.	Meet industry standards for fire suppression training (e.g., National Wildfire Coordinating Group Firefighter Certification Standards).
				Recognize symptoms of animal and plant diseases and use appropriate techniques to prevent their spread.	Identify observable diseases impacting plants and animals.
					Describe how to report observance of disease infestations.
					Use appropriate techniques and equipment when working with bio-hazards.

Code	Topic	Course	Knowledge and Skill	Performance Element	Measurement Criteria
			(CONTINUED)	Recognize insect types and available controls to prevent insect infestation.	Identify and classify insects.
					Identify insect damage signs.
					Describe how to report observance of insect infestation.
				Use acceptable pesticides to treat insect infestation.	Obtain appropriate pesticide applicators' license.
					Apply materials to treat for insect infestation.
				Know law enforcement procedures to manage public gatherings and to gain entry into secure, closed or restricted areas.	Demonstrate precautions to use when interfacing with the public concerning regulations and law enforcement.
					Describe security issues for closed and restricted areas.
					Describe solutions to issues concerning public protection.
					Recognize potential threat situations for the public and other resource users.
					Identify the appropriate law enforcement authority.