

Natural Resource Science 1

Exam Information	Description
Exam number 170 Items 49 National Career Cluster Agriculture Energy & Natural Resources Certification available Yes	The Natural Resource Science 1 industry certification exam assesses knowledge and skills related to production management and conservation of natural resources. Learners demonstrate their understanding of major units including ecology, range resources, waste management, and land use. The exam emphasizes field and laboratory experiences.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Student Organizations in Agricultural Education (Optional)*	0%
2. Supervised Agricultural Experience*	4%
3. Natural Resource Science and Management*	28%
4. Ecological Concepts and Science Principles*	36%
5. Range Resources and Management*	16%
6. Waste Management	8%
7. Land Classification, Resource Inventories, and Monitoring Methods*	8%

*Includes performance skill evaluation

Standard 1 - Student Organizations in Agricultural Education (Optional) (0% of exam score)

Candidates will explain the role of student organizations in agricultural education.

Objective 1 Discuss the history and organization of student organizations as they relate to the complete program of agricultural education.

1. Explain the interrelationship of classroom and laboratory instruction, supervised agricultural experience, and student organizations.
2. Describe how, when, and why student organizations were organized.
3. Identify key historical events within student organizations.
4. Identify the mission and strategies, colors, motto, emblem and parts of the emblem, and organizational structure of student organizations.
5. Recite and explain the meaning of a student organization's creed.
6. Discuss the meaning and purpose of a program of activities and its committee structure.
7. List student organizations' officers and discuss the role of each.

Objective 2 Identify opportunities in student organizations.

1. Describe student organizations' opportunities that develop leadership skills, personal growth, and career success.
2. Summarize major state and national activities available to members within student organizations

Objective 3 Describe student organizations' degrees, awards, and career development events (CDEs).

1. List and explain student organizations' degree areas.
2. Identify student organizations' proficiency awards.
3. List and discuss various team and individual CDEs.

Optional: Standard performance evaluations on the final page of this document

Standard 2 - Supervised Agricultural Experience (4%)

Candidates will explain the role of supervised agricultural experience (SAE) programs in agricultural education.

Objective 1 Examine the responsibilities and benefits associated with an SAE.

1. Explain the meaning and benefits of supervised agricultural experience programs.
2. Explain the characteristics of an effective SAE program and the responsibilities of those involved.

Objective 2 Determine the types of SAE programs.

1. Compare entrepreneurship SAEs and placement SAEs.
2. Describe research/experimentation SAEs.
3. Describe exploratory SAEs.

Objective 3 Plan an SAE program.

1. Identify the steps in planning an SAE program.
2. Describe the function of a business/training plan and/or agreement in an SAE program.
3. Develop a short-range plan and a long-range plan for an SAE program.
4. Relate classroom and laboratory instruction to an SAE program.

Objective 4 Maintain and use SAE records.

1. Explain the importance of keeping records on an SAE program.
2. Explain how SAE records are organized.
3. Follow approved procedures to make entries in SAE records.

Optional: Standard performance evaluations on the final page of this document

Standard 3 - Natural Resource Science and Management (28%)

Candidates will examine natural resource science and management.

Objective 1 Discuss the basics of natural resource science and management.

1. Identify types of natural resources.
2. Distinguish between renewable and nonrenewable resources.
3. Explain the difference between inexhaustible and exhaustible resources.
4. Explain the concept of interdependent relationships.

Objective 2 Examine the relationship between natural resources and society, including conflict management.

1. Define natural resource management.
2. Identify and compare major natural resource management agencies and companies.
3. Describe human demands on natural resources.
4. Compare and contrast conservation and preservation.
5. Provide examples of multiple uses of natural resources. (e.g., recreation, mining, agriculture, forestry, etc.)
6. Explore and describe societal issues related to natural resource management.

Objective 3 Identify career opportunities in natural resource science.

1. Identify and describe the major areas of natural resource science.
2. Identify career opportunities in natural resource science and determine the education and training they entail.

Optional: Standard performance evaluations on the final page of this document

Standard 4 - Ecological Concepts and Science Principles (36%)

Candidates will investigate ecological concepts and science principles related to natural resource systems.

Objective 1 Examine ecology.

1. Define ecosystem and related terms. (e.g. climate, precipitation, weather, etc.)
2. Describe the interdependence of organisms within an ecosystem including; population, community, biotic and abiotic factors, trophic levels, and food chain.
3. Describe and identify a habitat; food, water, shelter, and space.
4. Describe the processes associated with ecological succession.
5. Explain population ecology, population density, and population dispersion.
6. Explain the importance of biodiversity.
7. Explain the process of natural selection.
8. Use taxonomy keys to identify common plants and animals.
9. Identify and classify game birds and other local birds.
10. Identify and classify game animals and other local animals.
11. Define invasive species and discuss factors that influence the establishment and spread of invasive species

Objective 2 Describe biological, physical, and chemical properties of soil.

1. Explain the importance of soil as a life-supporting layer.
2. Explain the roles of parent material, topography, organisms, time, weathering, and climate in soil formation.
3. Describe the physical characteristics of soil.
4. Describe the biodiversity found in soil and the contribution of biodiversity to the physical and chemical characteristics of soil.
5. Describe the chemical properties of soil.
6. Explain the characteristics of soil water

Objective 3 Examine hydrology principles.

1. Describe the movement of water through the water cycle.
2. Compare and contrast groundwater and surface-water flow.
3. Discriminate between point and nonpoint pollution sources.
4. Survey the local area for pollution sources.
5. Calculate water distribution for an irrigation district.
6. Compare and contrast water usage in flood irrigation systems and sprinkler irrigation systems.
7. Identify local drinking water sources and measures that may be taken to protect the quality of the drinking (potable) water.
8. Discuss current regulations associated with water quality and water pollution.
9. Compare and contrast the differences between fresh water and salt/saline water.

Objective 4 Investigate air resources.

1. Identify components and structural layers of the earth's atmosphere.
2. Identify sources of air pollution.
3. Describe the effects of air pollution on people and their environment.
4. Illustrate the formation of acid precipitation and explain its impact on the environment.

Optional: Standard performance evaluations on the final page of this document

Standard 5 - Range Resources and Management (16%)

Candidates will relate range resources and management to natural resources.

Objective 1 Analyze the interrelationships between range management and other natural resource activities.

1. Identify characteristics of healthy rangeland.
2. Identify methods of rangeland improvement. (e.g. facilities, wells, springs, reseeding, chaining, etc.)
3. Evaluate a rangeland and develop a management plan for improvement.
4. Discuss livestock use of rangeland. (e.g. Animal Unit Month (AUM) carrying capacity)
5. Discuss wildlife use of rangeland.
6. Discuss additional uses of rangeland. (e.g., recreation, mining, watershed, etc.)
7. Compare and contrast the effect of various uses of rangelands.
8. Describe plant environment interactions.
9. Explain range transects and their use in evaluating a specific location.

Optional: Standard performance evaluations on the final page of this document

Standard 6 - Waste Management (8%)

Candidates will examine waste management.

Objective 1 Investigate waste generation, waste reduction, and disposal.

1. Describe different types of solid waste.
2. Evaluate environmental hazards created by different types of solid waste, solid waste accumulation, and solid waste disposal.
3. Explain practical management options for treating solid waste.
4. Explain the importance of reducing, reusing, and recycling.
5. Describe recycling methods and identify materials that can be recycled. (e.g. biogas generation, green waste composting, animal waste recycling, etc.)
6. Define wastewater (effluent).
7. Discuss the general steps in wastewater treatment.
8. Assess agriculture's impact on the environment through waste generation. (e.g., animal waste, pesticide residue, fertilizer runoff, sedimentation/erosion, and odors/dust)
9. Discuss the meaning and use of nutrient management plans.

Standard 7 - Land Classification, Resource Inventories, and Monitoring Methods (8%)

Candidates will explain land classification, resource inventories, and monitoring methods.

Objective 1 Discuss land-use management planning.

1. Describe the interrelationships between land-use planning and natural resources.

2. Identify land uses, capability factors, and land capability classes.
3. Demonstrate how GIS/GPS applies to land-use planning.
4. Use a soil survey to determine the land capability classes for different parcels of land in an area.

Objective 2 Discuss monitoring of land use.

1. Identify the components of a monitoring plan.
2. Discuss the procedures for conducting resource inventories and population studies.
3. List and describe the required components of an Environmental Impact Statement (EIS).
4. Develop and implement a basic plan for monitoring a natural resource project.
5. Participate in public involvement processes in land-use planning.

Optional: Standard performance evaluations on the final page of this document

Performance Skills Evaluation

Exam name: Natural Resource Science 1

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 1 - Student Organizations in Agricultural Education Attend a student organization meeting.	Pass:
Standard 2 - Agricultural Experience in Agricultural Education Participate in an SAE as part of an integral system approach to Agricultural Education.	Pass:
Standard 3 - Natural Resource Science Management Participate in a conflict management activity in an SAE as part of an integral system approach to Agricultural Education.	Pass:
Standard 4 - Ecological Concepts and Science Principles - Test and analyze water quality. - Demonstrate air-monitoring techniques. - Collect and interpret weather data.	Pass:
Standard 5 - Range Resources and Management - Test and analyze water quality. - Demonstrate air-monitoring techniques. - Collect and interpret weather data.	Pass:
Standard 7 - Land Classification/Resource Inventories/ Monitoring Method - Survey a site to determine potential land use. - Analyze a current local Environmental Impact Statement (EIS) and determine the preferred alternative.	Pass:

Evaluator Name: _____

Date: _____