



Natural Resource Science I

EXAM INFORMATION

Exam Number

170

Items

49

Points

56

Prerequisites

NONE

Recommended Course Length

ONE YEAR

National Career Cluster

AGRICULTURE, FOOD & NATURAL
RESOURCES

Performance Standards

INCLUDED (OPTIONAL)

Certificate Available

YES

DESCRIPTION

Students will develop knowledge and skills related to production management and conservation of natural resources. Major units will include ecology, range resources, waste management, and land use. Field and laboratory experiences will be emphasized.

EXAM BLUEPRINT

STANDARD

PERCENTAGE OF EXAM

1- Student Organizations in Agricultural Education (Optional)	
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%



STANDARD 1 (Optional)

STUDENTS 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.

Standard 1 Performance Evaluation included below (Optional)

STANDARD 2

STUDENTS 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.



Objective 4

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.
- 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.

Standard 2 Performance Evaluation included below (Optional)

STANDARD 3

STUDENTS 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.

Standard 3 Performance Evaluation included below (Optional)

STANDARD 4

STUDENTS 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, tropic levels, and food chain.
 3. Describe and identify a habitat; food, water, shelter, and space.



3. Describe the processes associated with ecological succession.
4. Explain population ecology, population density, and population dispersion.
5. Explain the importance of biodiversity.
6. Explain the process of natural selection.
7. Use taxonomy keys to identify common plants and animals.
8. Identify and classify game birds and other local birds.
9. Identify and classify game animals and other local animals.
10. 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 ground water 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.

Standard 4 Performance Evaluation included below (Optional)

STANDARD 5

STUDENTS 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.

Standard 5 Performance Evaluation included below (Optional)

STANDARD 6

STUDENTS 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

STUDENTS 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.

Standard 7 Performance Evaluation included below (Optional)



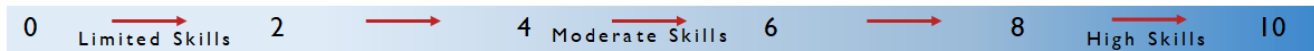
Natural Resource Science I Performance Standards (Optional)

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of **8 or higher** on the rating scale. Students may be encouraged to repeat the objectives until they average **8 or higher**.

Students Name _____

Class _____

PERFORMANCE RATING SCALE



STANDARD 1 Student Organizations in Agricultural Education **Score:**

- Attend a student organization meeting

STANDARD 2 Agricultural Experience in Agricultural Education **Score:**

- Participate in an SAE as part of an integral system approach to Agricultural Education

STANDARD 3 Natural Resource Science Management **Score:**

- Participate in a conflict management activity

STANDARD 4 Ecological Concepts and Science Principles **Score:**

- Test and analyze water quality
- Demonstrate air-monitoring techniques
- Collect and interpret weather data

STANDARD 5 Range Resources and Management **Score:**

- Observe a professional in natural resource management

STANDARD 7 Land Classification, Resource Inventories, and Monitoring Methods **Score:**

- Survey a site to determine potential land use
- Analyze a current local Environmental Impact Statement (EIS) and determine the preferred alternative



PERFORMANCE STANDARD AVERAGE SCORE:

Evaluator Name _____

Evaluator Title _____

Evaluator Signature _____

Date _____