

## Environmental Technology (CIP 15.0507)

### Occupational Skills

**The student demonstrates the specified level of competency in occupational skills.**

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>No Exposure</b>	<b>Introduced</b>	<b>Practiced</b>	<b>Entry Level</b>	<b>Competency</b>

### Environmental and Natural Resources Technology

- |                          |                          |                          |                          |                          |           |   |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|---|
| <b>0</b>                 | <b>1</b>                 | <b>2</b>                 | <b>3</b>                 | <b>4</b>                 |           |   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>A.</b> | <b>Core</b><br><b>Conduct Water Quality Studies</b><br>(VT Framework: 1.3, 1.8, 1.10, 1.17, 1.18, 1.21, 2.1, 2.2, 2.3, 7.13 ccc., 7.18) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>B.</b> | <b>Apply Wastewater Treatment Methods</b><br>(VT Framework: 1.10, 1.18, 1.19, 1.20, 2.3, 2.5, 7.13 bbb., 7.18)                          |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>C.</b> | <b>Demonstrate Effective Solid and Hazardous Waste Management</b> (VT Framework: 1.13, 1.18, 1.19, 7.15 eee., 7.16 dd., 7.18 bb.)       |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>D.</b> | <b>Perform Forest Management Tasks</b><br>(VT Framework: 1.13, 2.5, 7.13 ccc., 7.15 eee., 7.16 aaa.)                                    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>E.</b> | <b>Apply Wildlife Management</b><br>(VT Framework: 1.13, 1.19, 1.22, 2.1, 7.13 bbb., 7.15 eee.)   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>F.</b> | <b>Conduct Air Quality Management Studies</b><br>(VT Framework: 1.5, 1.8, 2.2, 2.5, 7.15 ccc., eee., 7.18 bb.)                          |

#### Specialization Options (Choose One of Two Options)

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|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|---|
| <b>0</b>                 | <b>1</b>                 | <b>2</b>                 | <b>3</b>                 | <b>4</b>                 |           |   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>A.</b> | <b>Environmental Technology Specialization</b><br><b>Operate and Calibrate Lab an field Instruments</b><br>(VT Framework: 1.18, 2.5, 7.13 ccc., 7.18)   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>B.</b> | <b>Perform Advanced Sampling Technique and Analysis</b><br>(VT Framework: 1.8, 1.17, 1.18, 1.20, 2.5, 7.13 bbb., ccc., 7.15 aaa., 7.17 bb., 7.18, 7.19) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>C.</b> | <b>Inspect Water, Air, and Soil Sampling Equipment, Perform Maintenance</b><br>(VT Framework: 7.17 bb., 7.18 bb., 7.19)                                 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <b>D.</b> | <b>Monitor Groundwater</b><br>(VT Framework: 7.15 aaa., 7.18 aaa., 7.14)  |

- E. Comply with Current Waste Management Practices and Laws Applicable to Groundwater**  
(VT Framework: 1.3, 7.13 bbb., 7.15 eee.)
- F. Develop Site Safety Programs**  
(VT Framework: 2.4)
- G. Perform Environmental Site Assessments**  
(VT Framework: 1.5, 1.6 aa., 1.21, 2.3, 7.13 ccc., 7.19)
- H. Analyze Municipal Solid Waste Plans**  
(VT Framework: 2.1, 7.16 dd, 7.17 ddd, 7.19)
- I. Design and Operate a Composting Facility**  
(VT Framework: 1.22, 7.13 ddd., 7.15 eee., 7.16 dd., 7.17 ddd., 7.19)
- J. Identify Smog Related Issues**
- K. Diagnose Indoor Air Pollution**  
(VT Framework: 1..7, 2.4, 2.5, 7.18 bb,)
- L. Observe Effects of Acid Rain**  
(VT Framework: 7.13 ccc., 7.15 ccc., 7.19)
- 0 1 2 3 4**  
 **A. Natural Resources Conservation Specialization Practice Workplace Equipment Safety that Meets Industry Standards**
- B. Identify Recreational Area Environmental Management Principles**  
(VT Framework: 2.1, 7.15 eee., 7.19)
- C. Manage Endangered Species**  
(VT Framework: 1.13, 7.15 aaa., 7.19)
- D. Establish and Manage Wildlife Habitat**  
(VT Framework: 1.17, 7.13 bbb., ccc., 7.15 aaa., eee.)
- E. Manage Animal Wildlife**  
(VT Framework: (7.13 aaa., bbb., ccc., 7.15 eee., 7.19)
- F. Manage Plant Wildlife**  
(VT Framework: 7.13 aaa., bbb., 7.19)
- G. Harvest and Process Timber**  
(VT Framework: 7.16 aaa.)
- H. Apply Surveying and Mapping Skills**  
(VT Framework: 1.17, 7.15 aaa., 7.17 bb., 7.18 bb.)
- I. Operate and Maintain Forestry / Conservation Equipment**  
(Vermont Framework: 7.18)
- J. Apply Best Management Practices to Conserve Soil and Water**  
(Vermont Framework: 2.1, 7.18 bb.)

### Directions

Evaluate the student by checking the appropriate box to indicate the degree of competency. The rating for each competency should reflect **employability readiness** rather than the grades given in class.

#### Rating Scale:

- 0**     **No exposure**
- 1**     **Introduced** – the student has been exposed through non-participatory instruction (e.g. lecture, demonstration, field trip, video)
- 2**     **Practiced** – the student can perform the task with direct supervision.
- 3**     **Entry-Level Competency** – the student can perform the task with limited supervision and/or does not perform the task to standards (a typical entry-level performance expectation).
- 4**     **Competency** – the student consistently performs task to standards with no supervision (on at least two occasions or at instructor’s option).

### Environmental Technology Core

**0 1 2 3 4**

**A.            Conduct Water Quality Studies**

- A.001     Identify common threats to groundwater and surface water.
- A.002     Identify different types of soils.
- A.003     Select best management practices for maintaining water quality.
- A.004     Identify constituents in effluent and affects on water quality.
- A.005     Demonstrate managing and remediation of water pollution.

**0 1 2 3 4**

**B.            Apply Wastewater Treatment Methods**

- B.001     Identify basic characteristics and principles of wastewater treatment.
- B.002     Demonstrate sampling techniques and sample interpretation.
- B.003     Use mathematics to solve problems common in wastewater treatment – facility operations.
- B.004     Identify basic characteristics and principles of wastewater treatment.

B.005 Demonstrate process of preliminary, primary, secondary, and tertiary treatments.

**0 1 2 3 4**

**C. Demonstrate Effective Solid and Hazardous Waste Management**

- C.001 Describe regulations that govern hazardous wastes.
- C.002 Describe permitting processes for hazardous waste facilities.
- C.003 Perform the packaging of hazardous wastes (Lab Packs).
- C.004 Describe regulations that govern disposal of solid wastes.
- C.005 Develop recycling programs.
- C.006 Demonstrate an understanding of landfill operations.

**0 1 2 3 4**

**D. Perform Forest Management Tasks**

- D.001 Identify tree species (using twigs, bark, ...).
- D.002 Estimate volume of standing trees with a Biltmore/International or Vermont stick, tally sheet, and volume tables.
- D.003 Be familiar with the multi-use concept of forest management.
- D.004 Demonstrate knowledge of the selection of harvesting systems, according to state standards (Best Management Practice).
- D.005 Develop recycling programs.

**0 1 2 3 4**

**E. Apply Wildlife Management Skills**

- E.001 Identify wildlife management principles.
- E.002 Identify recreational area environmental management principles.
- E.003 Show interconnections in a food web.
- E.004 Demonstrate knowledge of the predator/prey relationship.
- E.005 Distinguish between the types of birds.
- E.006 Distinguish between small mammals and large mammals.
- E.007 List major fish species.

**0 1 2 3 4**

**F. Conduct Air Quality Management Studies**

- F.001 Assess environmental effects of air pollution.
- F.002 Interpret air pollutants and their health hazards.
- F.003 Determine composition and percentage of air components (unpolluted).
- F.004 Describe climate change (Greenhouse Effect).

### **Environmental Technology Specialty**

**0 1 2 3 4**

#### **A. Operate and Calibrate Lab and Field Instruments**

- A.001 Follow established methodology.
- A.002 Follow equipment operating instructions.
- A.003 Prepare equipment.
- A.004 Prepare reagents and standards.
- A.005 Perform physical tests.
- A.006 Centrifuge samples.
- A.007 Titrate samples.
- A.008 Pipette solutions.
- A.009 Perform serial dilutions.
- A.010 Perform analytic dilutions.
- A.011 Operate testing equipment.
- A.012 Perform plate counts.
- A.013 Perform gram stains
- A.014 Analyze slides.
- A.015 Store samples.

**0 1 2 3 4**

#### **B. Perform Advanced Sampling Techniques and Analysis**

- B.001 Keep a field diary.
- B.002 Determine reason for sample.
- B.003 Define risks associated with sampling.
- B.004 Identify equipment needed.
- B.005 Perform sampling protocol.
- B.006 Identify proper testing procedures.

- B.007 Analyze samples.
- B.008 Interpret test results.
- B.009 Maintain required records.

**0 1 2 3 4**

**C. Inspect Water, Air and Soil Sampling Equipment and Perform Preventive Maintenance**

- C.001 Start a maintenance record-keeping system that provides information to protect equipment warranties, to prepare budgets and to satisfy regulatory agencies.
- C.002 Recognize symptoms that indicate equipment is not performing properly, identify source of the problem, and take corrective action.
- C.003 Perform maintenance as directed by manufacturers.
- C.004 Determine when assistance is required to correct a problem.

**0 1 2 3 4**

**D. Monitor Groundwater**

**0 1 2 3 4**

**E. Comply with Current Waste Management Practices and Laws Applicable to Protecting Groundwater**

- E.001 Understand state DEP regulations.
- E.002 Understand federal EPA regulations.
- E.003 Understand contractual agreements.

**0 1 2 3 4**

**F. Develop Site Safety Programs**

- F.001 Use spill clean-up kits.
- F.002 Identify incompatible combinations of chemicals that could result in potentially dangerous situations.
- F.003 Present safety information in a clear and concise manner.
- F.004 Understand “Right to Know”.
- F.005 Understand health risks.
- F.006 Understand emergency procedures.

**0 1 2 3 4**

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**G. Perform Environmental Site Assessments**

- G.001 Design an investigation.
- G.002 Identify information needed.
- G.003 Read blueprints, schematics and maps.
- G.004 Collect information.
- G.005 Collect samples.
- G.006 Analyze samples.
- G.007 Process data.
- G.008 Write technical reports.

**0 1 2 3 4**

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**H. Analyze Municipal Solid Waste Plans**

- H.001 Understand organizational structure.
- H.002 Identify types of waste.
- H.003 Receive materials.
- H.004 Sort, compact, load materials.
- H.005 Process recyclables.
- H.006 Collect garbage, yard waste, recyclables, hazardous waste, and biomedical waste.

**0 1 2 3 4**

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**I. Design and Operate a Composting Facility**

- I.001 Understand the biology, chemistry, and physics of composting.
- I.002 Design and construct indoor and outdoor bioreactors.
- I.003 Operate worm composting and thermophilic (“hot”) composting.
- I.004 Determine the best mix of composting ingredients.
- I.005 Monitor the composting process and test the properties of finished compost.
- I.006 Determine the effects of compost on plant growth.

**0 1 2 3 4**

**J. Identify Smog Related Issues**

- J.001 Determine air quality standards.
- J.002 Collect air samples.
- J.003 Analyze samples for presence of pollution.
- J.004 Describe remediation processes.

**0 1 2 3 4**

**K. Diagnose Indoor Air Pollution**

- K.001 Determine nature and extent of exposure.
- K.002 Determine applicable regulations.
- K.003 Assess equipment and processes.
- K.004 Develop sampling strategy.
- K.005 Determine appropriate sampling/analytical techniques.
- K.006 Collect representative air samples.
- K.007 Submit samples for analysis.
- K.008 Evaluate lab results.
- K.009 Recommend corrective actions.
- K.010 Develop written report.

**0 1 2 3 4**

**L. Observe Effects of Acid Rain**

- L.001 Monitor acid precipitation.
- L.002 Compare vegetation in soils that have natural buffering capacity with less buffered soils.
- L.003 Show the effects of acidic depositions on humans.

**Natural Resources Conservation Specialty**

**0 1 2 3 4**

**A. Practice Work Place/Equipment Safety That Meets Industry Safety Standards**

- A.001 Use appropriate clothing, shoes/boots, safety glasses, ear protection, breathing apparatus, shields, and other safety equipment.
- A.002 Follow appropriate fire safety practices.
- A.003 Follow appropriate first aid procedures.
- A.004 Follow proper hazardous chemical/material control procedures, being aware of the “Right to Know” regulations.
- A.005 Use required tools and equipment in a safe manner.
- A.006 Identify unsafe conditions and follow emergency procedures.

0 1 2 3 4  
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**B. Identify Recreational Area Environmental Management Principles**

- B.001 Identify kinds of outdoor recreation in Vermont.
- B.002 Distinguish between consumptive and non-consumptive recreational uses of natural resources.
- B.003 Show the economic and environmental impact of outdoor recreation.
- B.004 Determine best management practices that will improve the environment for outdoor recreation.

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**C. Manage Endangered Species**

- C.001 Identify animal and plant wildlife endangered species in Vermont.
- C.002 Understand Federal and State Endangered Species in Vermont.
- C.003 Demonstrate knowledge of how wildlife becomes endangered.
- C.004 Identify best practices to improve and protect endangered species.

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**D. Establish and Manage Wildlife Habitat**

- D.001 Determine habitat requirements.
- D.002 Establish habitat management goals.
- D.003 Determine sources of habitat pollution and destruction.
- D.004 Demonstrate practices that prevent habitat pollution.

**0 1 2 3 4**

**E. Manage Animal Wildlife.**

- E.001 Understand animal biological systems and needs.
- E.002 Develop habitat that meets species requirements.

**0 1 2 3 4**

**F. Manage Plant Wildlife**

- F.001 Understand plant biological systems and needs.
- F.002 Develop habitat that benefits wild plants.
- F.003 Balance forest management with animal wildlife and human resource needs.
- F.004 Promote the production of browse, herbage, and mast.

**0 1 2 3 4**

**G. Harvest and Process Timber**

- G.001 Demonstrate knowledge of the selection of harvesting systems, according to state standards (Best Management Practices).
- G.002 Identify logs and lumber.
- G.003 Perform safe felling procedures.
- G.004 Measure, grade, and buck tree length logs, according to industry standards.
- G.005 Tally and scale lumber, according to industry standards (NELMA).
- G.006 Operate chain saws in a safe manner to manufacturers' specifications.

**0 1 2 3 4**

**H. Apply Surveying and Mapping Skills**

- H.001 Use scales, rulers, compasses, stereoscope, and other instruments.
- H.002 Use topographic maps and aerial photographs.
- H.003 Measure acreage and distance.
- H.004 Read and interpret map symbols and scales.
- H.005 Use surveying equipment such as a hand or staff compass, and transit or level (including state of the art surveying equipment.)
- H.006 Locate corners, boundary lines and bench marks on a piece of land.

**0 1 2 3 4**

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**I. Operate and Maintain Forestry/Conservation Equipment**

- I.001 Safely maintain the proper hand and power tools for specific jobs.
- I.002 Service gasoline (2 and 4 cycle) and diesel engines to manufacturer's specifications.
- I.003 Maintain chain saws in a safe manner to manufacturer's specifications.

**0 1 2 3 4**

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**J. Apply Best Management Practices to Conserve Soil and Water**

- J.001 Identify and assess types of soil erosion.
- J.002 Select specific state-approved methods for controlling soil erosion (water bars, check dams, silt fencing,...)
- J.003 Illustrate current environmental regulations that impact on forestry practices.
- J.004 Illustrate common water conservation practices (sod water ways, tile drainage, diversion ditches, field drainage ditches,...).
- J.005 identify agencies and organizations which provide assistance with soil and water conservation practices.
- J.006 Determine acceptable management practices for maintaining water quality on logging operations.