

**INDIANA FFA ORGANIZATION**  
**SOILS EVALUATION CAREER DEVELOPMENT EVENT**

***OBJECTIVES AND ACADEMIC CROSSWALKS***  
***REVISED – SEPTEMBER 2002***

## **DESCRIPTION**

The Soils Career Development Event teaches students how to recognize important soil and landscape properties and to consider these properties in deciding how to use soils without harming them.

## **OBJECTIVES**

1. Students will be able to explain how soils relate to their environment and how they form.
2. Students will be able to understand soil parent material as a property to be determined in the field
3. Students will be able to recognize the potential for soil erosion by wind and water, for soil compaction, water pollution, emphasized conservation buffers, recognize the importance of wetlands and fertility levels.
4. Students will understand the importance of soil properties in both agriculture and home site evaluation and selection.
5. Students will improve in academic areas, particularly in the area of science.

## *Physics*

<b>Principle</b>	<b>Academic Standards</b>	<b>Soils Career Development Event Practicum's</b>
<b>The Properties of Matter</b>	<u>P.1.2</u> Measure or determine the physical quantities including mass, charge, pressure, volume, temperature, and density of an object or unknown sample	<ul style="list-style-type: none"> <li>• Determine the % loss of top soil and organic matter within a sample area</li> <li>• Determine the cat ion exchange capacity based upon a level of soil minerals such as clay, silt and sand</li> </ul>
<b>Structure and Properties of Matter</b>	<u>CP.1.1</u> Understand and explain that atoms have a positive nucleus (consisting of relatively massive positive protons and neutral neutrons) surrounded by negative electrons of much smaller mass, some of which may be lost, gained, or shared when interacting with other atoms	<ul style="list-style-type: none"> <li>• Determine the amount of nutrients needed for the soil based upon pH and ion exchange capacity</li> <li>• Determine the soil absorption fields based upon negative and positive charges in the soil</li> <li>• Understand eutrophication, nitrification, denitrification, respiration, photosynthesis and oxidation within the sample area</li> </ul>
<b>Changes in Matter</b>	<p><u>CP.1.4</u> Know and explain that physical properties can be used to differentiate among pure substances, solutions, and heterogeneous mixtures.</p> <p><u>CP.1.5</u> Distinguish among chemical and physical changes in matter by identifying characteristics of these changes.</p> <p><u>CP.1.7</u> Identify the substances gaining and losing electrons in simple oxidation-reduction reactions.</p>	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine how living organisms have affected the soil characteristics</li> <li>• Determine the soil structure and how it affects the sample area</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>

## ***ENVIRONMENTAL SCIENCE, ADVANCED***

<b>Principle</b>	<b>Academic Standards</b>	<b>Soils Career Development Event Practicum's</b>
<b>Environmental Systems</b>	<p><u>ENV.1.1</u> Know and describe how ecosystems can be reasonably stable over hundreds or thousands of years. Consider as an example the ecosystem of the Great Plains prior to the advent of the horse in Native American Plains societies, from then until the advent of agriculture, and well into the present</p> <p><u>ENV.1.2</u> Understand and describe that if a disaster, such as flood or fire occurs, the damaged ecosystem is likely to recover in stage that eventually result in a system similar to the original one.</p>	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine how living organisms have affected the soil characteristics</li> <li>• Determine the soil structure and how it affects the sample area</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>
<b>Flow of Matter and Energy</b>	<p><u>ENV.1.4</u> Understand and explain that human beings are part of the Earth's ecosystems, and give examples of how human activities can, deliberately or inadvertently, alter ecosystems.</p> <p><u>ENV.1.10</u> Identify and measure biological, chemical, and physical factors with in an ecosystem.</p>	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine how living organisms have affected the soil characteristics</li> <li>• Determine the soil structure and how it affects the sample area</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>
<b>Natural Resources</b>	<p><u>ENV.1.13</u> Understand and describe how layers of energy rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.</p>	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine how living organisms have affected the soil characteristics</li> <li>• Determine the soil horizons of a sample and</li> </ul>

		how they affect the sample area
<b>Environmental Hazards</b>	<p><u>ENV.1.14</u> Recognize and explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle organic material from the remains of dead organisms.</p> <p><u>ENV.1.15</u> Describe how the chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways.</p> <p><u>ENV.1.21</u> Differentiate between renewable and non-renewable resources, and compare and contrast the pros and cons of using non-renewable resources.</p> <p><u>ENV.1.30</u> Describe how agricultural technology requires trade-offs between increased production and environmental harm and between efficient production and social values.</p> <p><u>ENV.1.35</u> Compare and contrast the beneficial and harmful effects of an environmental stressor, such as herbicides and pesticides, on plants and animals. Give examples of secondary effects on other environmental components.</p>	<ul style="list-style-type: none"> <li>• <i>Determining the parent material of the sample area</i></li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine how living organisms have affected the soil characteristics</li> <li>• Determine the soil structure and how it affects the sample area</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>

## ***EARTH AND SPACE SCIENCE***

<b>Principle</b>	<b>Academic Standards</b>	<b>Soils Career Development Event Practicum's</b>
<b>The Earth</b>	<u>ES.1.17</u> Describe the development and dynamics of climatic changes over time, such as the cycles of glaciation	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>
<b>Processes that Shape the Earth</b>	<p><u>ES.1.20</u> Describe the relationship among ground water, surface water, and glacial systems.</p> <p><u>ES.1.22</u> Compare the properties of rocks and mineral and their uses.</p> <p><u>ES.1.23</u> Explain motions, and locations of materials in the earth's lithosphere and interior. For example, describe the movement of the plates that made up the crust of the earth and the resulting formation of earthquakes, volcanoes, trenches, and mountains.</p> <p><u>ES.1.25</u> Investigate and discuss the origin of various land forms, such as mountains and rivers, and how they affect and are affected by human activities.</p> <p><u>ES.1.26</u> Differentiate among the processes of weathering, erosion, transportation of materials, deposition, and soil formation.</p> <p><u>ES.1.27</u> Illustrate the various processes that are involved in the rock cycle, and discuss how the total amount of material stays the same through formation, weathering, sedimentation, and reformation.</p>	<ul style="list-style-type: none"> <li>• Determining the parent material of the sample area</li> <li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li> <li>• Determine how climate affects soil fertility and characteristics</li> <li>• Determine the soil structure and how it affects the sample area</li> <li>• Determine the soil horizons of a sample and how they affect the sample area</li> </ul>

# ***CHEMISTRY***

<b>Principle</b>	<b>Academic Standards</b>	<b>Soils Career Development Event Practicum's</b>
<b>Properties of Matter</b>	<u>C.1.2</u> Determine the properties and quantities of matter such as mass, volume, temperature, density, melting point, boiling point, conductivity, solubility, color, numbers of moles, and pH (calculate pH from the hydrogen-ion concentration), and designate these properties as either extensive or intensive.	<ul style="list-style-type: none"><li>• Determine the soil structure and how it affects the sample area</li><li>• Determine the soil horizons of a sample and how they affect the sample area</li></ul>
<b>The Structure of Matter</b>	<u>C.1.3</u> Recognize indicator of chemical changes such as temperature change, the production of a gas, the production of a precipitate, of a color change. <u>C.1.26</u> Describe physical changes and properties of matter through sketches and descriptions of the involved materials	<ul style="list-style-type: none"><li>• Determining the parent material of the sample area</li><li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li><li>• Determine how climate affects soil fertility and characteristics</li><li>• Determine the soil structure and how it affects the sample area</li></ul>

# ***BIOLOGY***

<b>Principle</b>	<b>Academic Standards</b>	<b>Soils Career Development Event Practicum's</b>
<b>Ecology</b>	<p><u>B.1.37</u> Explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials. Recognize, therefore, that human activities and technology can change the flow and reduce the fertility of the land.</p> <p><u>B.1.44</u> Describe the flow of matter, nutrients, and energy within ecosystems.</p>	<ul style="list-style-type: none"><li>• Determining the parent material of the sample area</li><li>• Determining the relief of the sample area to determine natural drainage, erosion and soil temperature</li><li>• Determine how climate affects soil fertility and characteristics</li><li>• Determine how living organisms have affected the soil characteristics</li><li>• Determine the soil structure and how it affects the sample area</li></ul>