

**Western Technical College**

**10006110 Introductory Soils**

**Course Outcome Summary**

**Course Information**

|                            |  |
|----------------------------|--|
| <b>Description</b>         | Provides fundamental knowledge of soils. Course topics include soil formation and development, soil components, soil profile, soil classification and soil conservation. Sustainable soil management practices will be studied. Participants will experience soils concepts through the completion of hands-on activities. |
| <b>Career Cluster</b>      | Agriculture, Food and Natural Resources  |
| <b>Instructional Level</b> | Associate Degree Courses   |
| <b>Total Credits</b>       | 3  |
| <b>Total Hours</b>         | 72   |

**Textbooks**

*Soil Science and Management*. 6th Edition. Copyright 2014. Plaster, Edward. Publisher: Cengage Learning. ISBN-13:978-0-8400-2432-9. Required.

**Success Abilities**

1. Apply mathematical concepts.
2. Demonstrate ability to think critically.
3. Demonstrate ability to value self and work ethically with others in a diverse population.
4. Make decisions that incorporate the importance of sustainability.
5. Transfer social and natural science theories into practical applications.
6. Use effective communication skills.
7. Use technology effectively.

**Program Outcomes**

1. Interact as a professional in Agribusiness
2. Investigate opportunities in Agribusiness
3. Apply relevant technologies
4. Apply economic and marketing strategies to Agribusiness Industry

5. Develop an Agribusiness Management plan
6. Create a Crop Management Plan

## Course Competencies

### 1. Evaluate the physical properties of soil.

#### Assessment Strategies

- 1.1. Report

#### Criteria

*You will know you are successful when*

- 1.1. you name the 6 physical properties of soil.
- 1.2. you describe the importance of each of the six properties and the effect on soil quality.
- 1.3. you calculate sand, silt, clay percentages.
- 1.4. you determine the moisture-holding capacity.
- 1.5. you calculate soil density.

#### Learning Objectives

- 1.a. Describe color, texture, structure, consistency, density, and soil horizons.
- 1.b. Determine soil type, structure, and texture.
- 1.c. Identify soil horizons including formation, age, and history.
- 1.d. Determine soil density through analysis.
- 1.e. Describe the soil formation process.
- 1.f. Distinguish between physical and chemical weathering.
- 1.g. Identify key Wisconsin soil formation regions and their geographic locations.
- 1.h. Identify the characteristics of the twelve soil texture groups in a soil triangle.
- 1.i. Relate bulk and particle density to soil tilth.
- 1.j. Describe factors that influence color variations in a soil profile.
- 1.k. Assess how soil factors affect soil temperature.

### 2. Evaluate the chemical properties of soil.

#### Assessment Strategies

- 2.1. Activity using soil test and plant nutrient requirements

#### Criteria

*You will know you are successful when*

- 2.1. you explain how chemical properties apply to the production potential of soils.
- 2.2. you identify macro-nutrients.
- 2.3. you identify micro-nutrients.
- 2.4. you explain how pH impacts soil productivity.
- 2.5. you explain cation exchange capacity and how it applies to productivity.

#### Learning Objectives

- 2.a. Examine essential nutrients found in soils
- 2.b. Predict changes in soil due to chemical inputs
- 2.c. Describe soil PH and its development
- 2.d. Describe how PH affects plant growth
- 2.e. Explain how to lime or acidify soil
- 2.f. Complete lime calculations
- 2.g. Describe saline and sodic soils
- 2.h. Describe methods to treat and manage saline and sodic soils

### 3. Evaluate the biological properties of soil.

#### Assessment Strategies

- 3.1. Demonstration

#### Criteria

*You will know you are successful when*

- 3.1. you describe the living organisms in soil.
- 3.2. you identify how living organisms benefit the soil.
- 3.3. you explain how organic matter impacts soil health.

#### **Learning Objectives**

- 3.a. Apply different testing procedures to assess soil health.
- 3.b. Identify living organisms in the soil.
- 3.c. Compare the role of common minerals found in Wisconsin soils.
- 3.d. Summarize methods of maintaining biological activity at desirable levels
- 3.e. Recommend methods of increasing biological activity in the soil

### **4. Analyze soil conditions using soil science technologies and equipment**

#### **Assessment Strategies**

- 4.1. Demonstration

#### **Criteria**

*You will know you are successful when*

- 4.1. you collect a soil sample
- 4.2. you submit samples from a field to a soil test laboratory
- 4.3. you use equipment to identify problem areas in a field (such as a soil compaction meter)
- 4.4. you use GIS to identify exact locations for future reference

#### **Learning Objectives**

- 4.a. Determine number of samples needed from a given area
- 4.b. Interpret in-field variability when locating sample sites
- 4.c. Prepare a soil sample to be sent for analysis
- 4.d. Prepare a soil sample field information sheet
- 4.e. Explore resources available on Web Soil Survey
- 4.f. Calculate area measurements using a GIS
- 4.g. Operate a soil compaction meter
- 4.h. Operate a enabled soil pH meter

### **5. Investigate soil water**

#### **Assessment Strategies**

- 5.1. Research paper

#### **Criteria**

*You will know you are successful when*

- 5.1. you describe the hydrological cycle
- 5.2. you identify the sources of soil water depletion
- 5.3. you relate soil type to potential of ground water contamination
- 5.4. you outline common terms of soil water and movement: infiltration, percolation, adhesion, cohesion, osmosis, diffusion, mass flow and capillary action.
- 5.5. you describe the three levels of soil moisture
- 5.6. you calculate irrigation rates and timing recommendations
- 5.7. you describe the process of soil drainage

#### **Learning Objectives**

- 5.a. Describe the hydrologic cycle.
- 5.b. Compare the four major types of soil water.
- 5.c. Identify sources of soil water depletion.
- 5.d. Relate soil type to potential for ground water contamination.
- 5.e. Describe soil conditions that are conducive to artificial drainage.
- 5.f. Describe soil conditions that are conducive to irrigation.
- 5.g. Recognize the impact of cultural practices on soil.
- 5.h. Outline common terms of soil water and movement: infiltration, percolation, adhesion, cohesion, osmosis, diffusion, mass flow and capillary action.
- 5.i. Describes the three levels of soil moisture

## **6. Develop basic nutrient management plan**

### **Assessment Strategies**

- 6.1. Skill Demonstration using Snap-Plus

### **Criteria**

*You will know you are successful when*

- 6.1. you import basic farm information into Snap-Plus
- 6.2. you navigate between areas of Snap-Plus program
- 6.3. you import soil tests into Snap-Plus
- 6.4. you build Farm Maps in Snap-Plus Maps
- 6.5. you create standard 590 plan reports in Snap-Plus
- 6.6. you adjust management decisions based on information generated from Snap-Plus
- 6.7. you check compliance of a Snap-plus program

### **Learning Objectives**

- 6.a. Examine the relationship between tillage systems and soil loss and compaction.
- 6.b. Compare the economic advantages and disadvantages of various tillage systems.
- 6.c. Describe the impact various tillage systems have on soil fertility.
- 6.d. Create 590 Plan maps using Snap-Maps including restriction, soil type, slope, and nutrient need maps.
- 6.e. Investigate the capabilities of Snap-Plus.

## **7. Evaluate how wind and water contribute to soil erosion.**

### **Assessment Strategies**

- 7.1. Activity - Public Service Announcement

### **Criteria**

*You will know you are successful when*

- 7.1. you describe how soil erosion occurs
- 7.2. you describe the effects of soil erosion
- 7.3. you determine types of erosion based on water and wind
- 7.4. you describe ways to prevent soil erosion

### **Learning Objectives**

- 7.a. Define erosion.
- 7.b. Compare the three major types of erosion by wind
- 7.c. Compare splash, sheet, rill and gully erosion.
- 7.d. Recognize the degrees of erosion by water.