



South Central College

VITI 1293 Soils for Viticulture

Course Outcome Summary

Course Information

Description	The course will explore soil properties and behavior and their influence on vine growth and wine grape characteristics. The course focuses not only on growth and production, but on the long-term effects of viticulture on soil quality and the wider environment. Upon completion of the course students will be able to select sites for a new vineyard, and help manage soils in existing vineyards. (Prerequisites: None)
Total Credits	3
Total Hours	48

Types of Instruction

Instruction Type	Credits/Hours
Lecture	3/48

Pre/Corequisites

None

Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Summarize soil types and the environment.

Learning Objectives

- Define the concept of terroir and how it relates to fine wines.
- Explain five reasons why soil management is important in vineyards.
- Describe the three main horizons of a soil profile.
- List and describe the five soil-forming factors.
- Describe and list at least five different types of parent materials.
- Justify why soil should be considered a natural body.
- List the components of soil and their percentage make-up.

2. Define the makeup of soil.

Learning Objectives

Define the term “soil texture” and determine the approximate soil texture by feel.
Use the soil textural triangle to divide soil into one of twelve soil texture classes.
Explain how soil texture affects soil temperature, water, and tilth.
Recognize the role of minerals in soil.
Define mineralization and immobilization.
Describe the C:N (carbon-nitrogen) ratio.
Explain the importance of decomposers and reducers in the soil biomass.
Describe the process for formation of humus.

3. Appraise the vine root habitat.

Learning Objectives

Identify the six characteristics involved in soil structure formation.
List and describe the five major types and four grades of soil aggregates.
Describe the factors that affect aggregate stability.
Explain what a soil pan is and why it is a concern.
Define soil pan and its impact on plant growth.
Describe the process of soil respiration and aeration.
Explain how and why soil temperature fluctuates.

4. Apply the concepts of soil fertility and chemistry.

Learning Objectives

List the 16 nutrients essential for plant growth.
Explain how soil texture and structure affect plant growth.
Describe the role of cation exchange in plant nutrition.
Discuss the important contributions of organic matter to soil properties.
Explain soil pH and the pH scale.
Infer how lime works in the soil and list common liming materials.
Calculate the ECCE, (effective calcium carbonate equivalent) CCE, (calcium carbonate equivalent) neutralizing value, and size reactivity of liming material.
Predict amounts of liming materials that should be applied to achieve the recommended lime requirements from a soil test report.
Describe how soil pH affects nutrient availability.
List the process or practices that cause soil pH to change.
Define soil solution and describe its relationship to nutrient availability.
Describe the concept of buffering capacity.
Explain the importance of the C:N ratio in the soil.
Define and calculate base saturation of a soil.

5. Describe how the soil supplies nutrients.

Learning Objectives

Explain the nutrient cycling process.
Discuss mineralization and immobilization process of nitrogen, phosphorus, and sulfur.
Explain how nutrient ions are retained and released in the soil.
Identify the concept of cation exchange capacity and its importance.
Describe the process by which plant roots absorb nutrients.

6. Explain the primary nutrients of soil.

Learning Objectives

Describe the functions of nitrogen, phosphorus, and potassium in crop growth.
Indicate and explain the nitrogen cycle.
Illustrate symbiotic nitrogen fixation.
Predict how physical properties and cropping systems affect nitrogen, phosphorus, and potassium fertilization.
Describe the properties of the common nitrogen fertilizers and their advantages and disadvantages.
Express how the soil retains phosphorus and potassium.
Summarize how immobilization and mineralization affect nutrient availability.
Discuss the role of potassium in the plant and the concept of luxury consumption.
List the analysis, physical form, and handling precautions of each of the following inorganic fertilizer sources: normal superphosphate, superphosphoric acid, triple superphosphate, diammonium phosphate, potassium chloride, potassium sulfate, and potassium nitrate.

Describe how fertilizer placement and time of application affect nutrient availability.
Discuss plant deficiency symptoms for nitrogen, phosphorous, and potassium.

7. Compare secondary and micro-nutrients.

Learning Objectives

Discuss the role of the secondary and micro-nutrients in plant growth.
Describe the plant deficiency symptoms of the secondary and micro-nutrients.
Identify methods of correcting secondary and micro-nutrients deficiencies.
List the ionic form of each nutrient which is available to plants.

8. Interpret the value of nutrients for healthy vines and good wines.

Learning Objectives

Describe the nutrient deficiency visual symptoms of five nutrients.
Convert nutrient requirements to fertilizer requirements.
List the advantages and disadvantages of the different nitrogen fertilizers.
Classify the advantages and disadvantages of the different phosphorous fertilizers.
List the sources of potassium, calcium, and magnesium fertilizers used in vineyards.
Explain how soil pH affects the availability of the macro and micronutrients.
Infer how soil acidification occurs and how to correct it.
State how the analysis of a petiole sample relates to nutrient requirements.
Compare and contrast the different methods of nutrient application.

9. Assess soil testing and interpretation.

Learning Objectives

Explain the procedures used in soil sampling.
Discuss soil test results and cost of soil testing.
Recognize the results of soil test summaries.
Describe the purpose of plant tissue analysis and describe how it is used in a soil fertility program.
Illustrate how to sample and submit plant samples for tissue analysis.
Explain how soil test values are used to make fertilizer recommendations.
Calculate nitrogen credits from animal wastes, sludge, legumes, and soil organic matter.
Compare fertilizer costs for a specified nutrient.

10. Evaluate plant nutrients and the environment.

Learning Objectives

Discuss the impact of fertilizer use on the environment.
Explain how nitrogen losses affect the environment.
Summarize the concepts of best management practices and integrated crop management.
Identify how site specific soil management can benefit the environment.

11. Recognize soil-water-vine relationships and water management.

Learning Objectives

Explain the concept of soil water potential.
Define "available water capacity."
Illustrate how water moves in the soil.
Diagram the hydrological cycle in a vineyard.
Explain how to manage irrigation with respect for soil water properties.
Compare and contrast micro and macro-irrigation systems.

12. Summarize soil quality in vineyards.

Learning Objectives

Describe the ideal physical soil environment for growing grapes.
Duplicate the ideal chemical soil environment for growing grapes.
Explain how to manage the biological properties of the soil.
Define and describe the major soil pests in grape growing.
List methods for controlling soil erosion in vineyards.
Describe the fate of chemicals, wastes, and nutrients in a vineyard.
List a ranking of soil types that are desirable for grape vine culture.
Produce a ranking of soil types that are undesirable for grape vine culture.

13. Appraise site selection and soil preparation.

Learning Objectives

List and explain five important factors to consider in site selection for a vineyard.
Interpret a soil survey to identify a favorable site.
Arrange a soil survey to locate a tract of land.
Construct a soil survey to describe characteristics of a soil profile of a tract of land.
Describe how to prepare a site for vineyard establishment.

14. Contrast the soils of wine regions.

Learning Objectives

Explain the concept of vines "in balance."
Compare and contrast the geographical and technical approach to terroir.
Describe the characteristics of the soils and wines of the Bordeaux Region in France.
Identify the characteristics of the soils and wines of the Burgundy Region in France.
Distinguish the characteristics of the soils and wines of the Napa Valley of California.
Describe the characteristics of the soils and wines of the Willamette Valley of Oregon.
Explain the characteristics of the soils and wines of the selected wine regions of Southeastern Australia.

SCC Accessibility Statement

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