

Prepared by Department of Natural Sciences & Life Fitness

Date of Departmental Approval: February 15, 2017

Date Approved by Curriculum and Programs: February 22, 2017

Effective: Fall 2017

1. **Course Number:** HOR101
Course Title: Plant and Soil Science
2. **Description:** This course provides an in-depth introduction to plant classification, anatomy, physiology, nutrition and reproduction. Chemical and physical properties of soil as well as the relationship between soils and plant growth are also emphasized. (3 class hours / 2 laboratory hours)
3. **Student Learning Outcomes:** Upon successful completion of this course, students are able to do the following:
 - Using anatomical terms, explain the various plant tissues and organs and how they relate to total plant growth.
 - Organize and explain the biological classification system and the levels of taxonomic categories.
 - Recognize and differentiate factors that may limit plant growth.
 - Describe the soil textural classes using laboratory analysis and field methods.
 - Explain numerous botanical and soil science terms and their common usage.
 - Work cooperatively in a small group setting to complete various laboratory exercises, following oral and written instructions.
 - Clearly explain or calculate the activities and then analyze the results for laboratory exercises.
 - Identify common deciduous and evergreen trees using a dichotomous key.
 - Discuss and describe the function of the various plant tissues.
 - Explain particle density, bulk density and pore space of a variety of soils.
 - Determine soil textural class using laboratory analysis and field methods.
 - Demonstrate the relationship between a soil's cation exchange capacity and nutrient requirements.
 - Calculate the magnification power of a compound microscope when using different objective lenses.
 - Calculate particle density, bulk density and total pore space of a variety of soils.
 - Using the Bouyoucos method, determine textural classification of soil.
 - Compute and graph particle size and water retention.
 - Determine the relationship between soil textural classification and pore space, water retention, and cation exchange capacity.
 - Utilize basic microscope skills to observe cells and tissues.
 - Utilize website links for help in understanding and visualizing complex concepts.
4. **Credits:** 4 credits
5. **Satisfies General Education Requirement:** Natural or Physical Science
6. **Prerequisites:** MAT020 (Prealgebra) or MAT025 (Pre-Algebra), ENL108 (Critical Reading & Thinking) or satisfactory basic skills assessment scores
7. **Semesters Offered:** Fall, Spring
8. **Suggested General Guidelines for Evaluation:** Course grading procedures are detailed in student handbook. In summary, grades are based on quizzes, exams, exams, final exam, laboratory reports, assignments and field projects.
9. **General Topical Outline:**
 - HOR101 Plant & Soil Science Lecture Outline**
 - I. Plant Classification
 - A. The Plant Kingdom
 - B. Botanical Classification
 - C. Horticulture Classification
 - II. Plant Structure and Function
 - A. Plant Cells

1. Cell Structure
2. Cellular absorption
3. Cell Division
- B. Plant Organs
 1. Internal and External Leaf Anatomy
 2. Internal and External Stem Anatomy
 3. Internal and External Root Anatomy
 4. Flower Anatomy
 - a. Classification of Flowers and Inflorescences
 - b. Factors Affecting Flowering
 5. Fruit Anatomy and Classification
- III. Plant Propagation
 - A. Sexual Propagation
 - B. Seed Anatomy and Germination
 - C. Vegetative Propagation
- IV. Plant Physiology
 - A. Photosynthesis
 - B. Respiration
 - C. Transpiration
 - D. Plant Hormones
- V. Soils and Soil Management
 - A. Soil Formation and Morphology
 - B. Chemical Properties of Soil
 - C. Physical Properties of Soil
 - D. Soil Organic Matter
- VI. Soil Nutrients and Plant Nutrition
 - A. Essential Elements for Plant Growth
 - B. Function of the Macronutrients
 - C. Plant Nutrient Deficiency Symptoms
 - D. Limestone and Liming
 - E. Fertilizers and Fertilizing

HOR 101L Plant & Soil Science Laboratory Exercises

1. The Plant Kingdom and Plant Classification
2. The Compound Microscope and the Plant Cell
3. Identification of Common Trees and Shrubs
4. Internal and External Leaf Anatomy
5. Internal and External Stem Anatomy
6. Internal and External Root Anatomy
7. Structure and Function of Flowers, Seeds and Fruit
8. The Gymnosperms
9. Soil Textural Analysis
10. Soil Particle Size Determination & Water Retention
11. Soil Particle Density, Bulk Density & Pore Space
12. Soil Morphology and Classification
13. Soil pH and Limestone Requirement
14. Plant Ecology