

Soils for Environmental Professionals Laboratory

SWS 5050L • Fall 2016 • 1 credit

Instructor: James Bonczek, Ph.D.
Soil and Water Science Department
2195 McCarty Hall A, P.O. Box 110290, Gainesville, FL 32611
Phone: 352-2943112; e-mail: bonczek@ufl.edu

Office Hours: Monday and Wednesday, 10:00-11:00

Prerequisite/Co-requisite: SWS 5050

Meeting time: Wednesday, 6-7 pd.

Overview:

This laboratory is intended for students who have had limited exposure to Soil and Water Science, and as a supplement to the graduate-level introductory soils course “Soils for Environmental Professionals”. Laboratory observations and experiments will emphasize the physical, chemical, and morphological characteristics of soils as well as common soil science laboratory techniques. Initial exercises will explore soil physical properties in relation to the environment, and characteristic soil morphological features. Subsequent labs will focus on common soil chemical reactions. Field exercises will provide a landscape-level context for the lab.

Objectives:

- Provide hands-on, practical experience with many of the tools and techniques of soil and water science in relation to the environment.
- Enhance student understanding of essential soil physical, chemical and morphological properties.
- Encourage students’ appreciation of soil as a crucial component to environmental systems.
- To reinforce, with practical exercises, the concepts presented in the lecture course.

Evaluation:

Grades will be based on two lab reports, and 2 quizzes.

Point Distribution

Weekly Lab results	50%
Quizzes	40%
Final Lab Report	10%

Scale: 90-100 **A**; 85-89 **B+**; 80-84 **B**; 75-79 **C+**; 70-74 **C**; 65-69 **D+**; 60-64 **D**; <60 **E**

Student Responsibilities:

- Weekly lab result submissions are required and include data tables and responses to various questions posed in the lab manual and in class
- Attendance is mandatory. No make-up labs. One absence is permitted.

Textbook: Laboratory Manual for Soils for Environmental Professionals
Target Copy Center.

Schedule of Labs by Topic:

1. Topic: Introduction

Soil Morphological Fundamentals / Quantitative Basics

- Basic Soil Morphology
- Soil Features
- Essential quantitative basics
- http://www.shodor.org/UNChem/unit_conv_tab.html

2. Topic: Soil Morphology in the Field

Observation and Sampling of Soils in the Field

- Field Exercise - Introduction including relevant morphological features such as horizon thickness, color, texture.
- The Hawthorne Formation
- Soil sampling
- Pedogenesis vs. geology.

3. Topic: Soil Physical Properties

Soil Physical Composition and Properties

- Soil Bulk Density
- Introduction to soil separates (sand, silt, clay)
- Soil textural classes, texture by feel, the textural triangle
- Determination of sand, silt and clay fractions in soils by sedimentation.
- The implications of Stokes law in translocation of colloids in soil profiles.

4. Topic: Soil Water

Soil Water Potential and Flow

- Film: Movement of Water in Soils
- Simulation and demonstration of the components of water potential.
- Darcy's equation
- Determination of saturated hydraulic conductivity of soil textural classes representing soil horizons observed in the field.
- Gravimetric and Volumetric water content determination
- Instruments: tensiometers, tempe cells, time domain reflectometry (TDR)

5. Topic: Soil Colloids

Mineral and Organic Colloids

- Cation adsorption
- Determination of the cation exchange capacities of surface soils and subsoils
- pH dependence of CEC.
- Flocculation and Dispersion

6. Topic: Soil Organic Matter, Organisms, and Chemical Movement in Soils

Organic Compounds

- Determination of organic matter content by dry combustion
- Determination of organic matter content by the Walkley-Black method.
- Determination of the contribution of organic matter to soil CEC
- Determination of the organic carbon partitioning coefficient for a neutral hydrophobic organic compound on surface soils and subsoils.
- Chemical Movement in Soils software (CMIS)
- Respiration by soil organisms

7. Topic: Soil Acidity

Active and Exchangeable Acidity

- Active acidity: measurement of soil solution pH and the influences of soil:solution ratios and background electrolytes (e.g. K^+ and Ca^{2+}).
- Exchangeable acidity: comparison of the total and exchangeable acidities of surface and subsoils using barium exchange.
- Determination of lime requirement based on crop and target pH (Adams-Evans).

8. Topic: Soil Salinity

Fundamentals of Soil Solution Salinity

- Soil solution composition
- Measurement and interpretation of soil electrical conductivity
- Determination of the exchangeable sodium percentage of soils.

9. Topic Soil Phosphorus

Phosphorous Behavior in Soils

- Phosphorous sorption isotherms
- Quality assurance/quality control

10. Topic: Soil Survey

Interpretations and applications

- Soil survey: Legal Descriptions
- Soil survey interpretation and uses: suitability of land for various applications (e.g. sanitary facilities, recreational development, etc.)

11. Florida Geology and Soil Formation

Topography, Drainage, and Parent Material in Relation to Soil Formation

Academic Honesty

In Fall 1995, the University of Florida student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by the students.

Preamble: In adopting this honor code, the students of the university of Florida recognize that academic honesty and integrity are fundamental values of the university community. Student who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action...

The Honor Code: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: ☐On my honor, I have neither given nor received unauthorized aid in doing this assignment.☐

☐Accommodations for Students with Disabilities:

Students requiring classroom or laboratory accommodations must first register with the Dean of Students Office. They will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

UF Counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. These resources include 1.) University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling; 2.) SHCC Mental Health, Student Health Care Center, 392-1171, personal counseling; 3.) Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling; and 4.) Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.