

**SWS 4116/5115 – Environmental Nutrient Management (3 credits)
Spring 2020**

Course description

Catalog description: Consumption, existing reserves, formulation, chemical and physical properties, and manufacture of commercial fertilizers; basic chemical reactions of fertilizer materials with the soil and the fate of the nutritional elements whether it be loss by leaching, plant uptake, fixation or soil retention.

This course focuses on how plant nutritional requirements can be satisfied to maximize yields, maintain soil fertility and soil health, and minimize environmental impacts. We will examine the role essential nutrients play in plant nutrition and how key biogeochemical reactions affect their availability in soils. We will cover how different fertility sources – primarily fertilizers but also manures, composts, etc. – supply nutrients to plants as well as challenges associated with their use. This course will present tools to manage soil nutrients sustainably, including soil and plant tissue testing, criteria to determine nutrient input requirements, and best management practices.

Prerequisites

SWS 4116: SWS 3022 – Introduction to Soils in the Environment

SWS 5115: SWS 5050 – Soils for Environmental Professionals

Instructor

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Teaching Assistant

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Course meeting times

Tuesday and Thursday, Period 2 and 3 (8:30-10:25), Pugh Hall 170

Course objectives

At the end of this class, students will be able to:

1. Describe nutrient cycles for nitrogen, phosphorus, and potassium in detail, including how they are measured in soils and their effect on crop production;

2. Compare the effects of different fertility sources (e.g., fertilizers vs. manures) and different forms of a given source (e.g., urea vs. ammonium nitrate fertilizers) on nutrient cycling;
3. Quantify crop nutrient demand and fertilizer/manure input rates to meet that demand;
4. Identify and evaluate the efficiency of different best management practices (BMPs);
5. Contrast different approaches used to manage soil fertility (e.g., conventional and organic);
6. Interpret soil testing results and nutrient input recommendations.

Textbook

There is no textbook requirement of this class. However, the following textbook is highly recommended for undergraduate and graduate students that envision a career where soil fertility plays a large role (e.g., crop consultant), including D.P.M. students.

Soil Fertility and Fertilizers (8th Ed.) by John Havlin et al. 2013; ISBN 013503373X, Pearson.

Course format

A combination of teaching methods will be used for this class: lectures and short in-class activities that focus on the general principles of nutrient management and a semester-long soil fertility trial at the Field and Fork gardens (FFG) on campus. All activities will take place on campus and students must use their own means to get to FFG on time; there is a bus stop nearby.

Students will work in small groups (4-5 students) for the trial and for the first two reports, although the final report is individual. Participation will be assessed and graded. This trial involves outside work where there is a large density of insects, including bees – dress according to weather conditions and let me know of any relevant medical condition (e.g., bee allergy).

Despite being a 3-credit class, there are 4 periods per week allocated to this class. We will use them according to this schedule:

- On days devoted to lectures, we will not use the two periods completely. We will do two 40-minute slots with a 10-minute break. Thus, we should be done by 10:00 instead of 10:25.
- When doing field activities related to the fertility trial, you will only need to attend for 1h instead of two periods. The period you will be attending will depend on your group.
- On days with guest speakers or in-class activities, we will use both 50-minute periods.

Class attendance

Attendance to all class meetings is highly encouraged, including for field activities (participation is graded for field trips). Student who miss class will be responsible to cover the material missed on their own. Lectures will be recorded and posted on canvas for students who miss class occasionally. Please turn off your cell phones or put them in silent mode during the class.

Make-Up Policy

Students need to request a permission to take a make-up exam before missing the exam, otherwise the student will be assigned the grade 0. Absences for health and personal reasons will typically be accommodated, but not requests based on a pre-planned trip or vacation.

Late assignments will get a 20% deduction for each late day, up to 2 days. If the assignment is submitted on or after the 3rd day, the student will be assigned the grade 0.

Please refer the official University policy for additional details:
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Grading system

Grade breakdown

Item	Points	Percentage
Exam 1 (Soils and crops review, N and P cycles)	125	12.5%
Exam 2 (Other macronutrients, micronutrients, acidity, salinity)	125	12.5%
Cumulative final exam (covers all material from the class)	250	25%
4 problem sets (5% each)	200	20%
Fertility trial	300	30%
1. 1 st report – soil tests, input recommendations	60	6%
2. 2 nd report – tissue sampling, crop health	60	6%
3. Final report – yields, soil tests, partial nutrient budgets	150	15%
4. Participation to fertility trial (0.5 pt. per field trip) ‡	30	3%

‡ Participation to field trips will be waived if students are withheld from campus due to COVID at the time of the field trip.

The grade breakdown is identical for both undergraduate and graduate sections, however the difficulty of problem sets and exams will be higher for the graduate section.

The final exam will take place during the period allocated for finals, not during our regular class meeting time. **The final cumulative exam will be held on Thursday April 29, 2019, between 7:30 and 9:30, in Pugh Hall 170.** If this changes throughout the semester, you will be notified in class and on canvas.

Grade scale

Letter	Points	Percentage
A	≥ 950	95 - 100
A-	≥ 900	90 - 94.9
B+	≥ 850	85 - 89.9
B	≥ 800	80 - 84.9
B-	≥ 760	76 - 79.9

Letter	Points	Percentage
C+	≥ 720	72 - 75.9
C	≥ 680	68 - 71.9
C-	≥ 640	64 - 67.9
D	≥ 600	60 - 63.9
E	< 600	< 60

For information on current UF policies for assigning grade points, see:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Additional information

Online Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

There will be time allocated in class to complete online evaluations on the last day of classes, on April 20.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks. **The problem sets and exams are individual assignments whereas the fertility trial is a group project, hence you may collaborate with your peers only for the first two reports of the fertility trial.** Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <https://sccr.dso.ufl.edu/process/student-honor-code/>.

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.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation

services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation: 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

1. *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*
 - Counseling Services
 - Groups and Workshops
 - Outreach and Consultation
 - Self-Help Library
 - Training Programs
 - Community Provider Database
2. U Matter We Care, www.umatter.ufl.edu/
3. *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

Student complaints

For a residential course, students who want to file an official complaint can do so through this link: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

Tentative schedule (subject to change due to crop growth, guest speaker availability, etc.)

Date	Topic	Reading from Havlin et al.	Assignments
Jan. 12	Introduction, class logistics Soil sampling basics	Chapter 1 Chapter 9 (336-344)	
<i>Jan. 14</i>	<i>Field trip: Soil sampling at FFG</i>		
Jan. 19	Review of soil properties and crop physiology/nutrition	Chapter 2	
Jan. 21	Nitrogen cycle & inputs Problem set (PS) demo	Chapter 4	Posted: PS1 (soil properties, N, P)
Jan. 26	Soil test interpretation In-class activity: Soil test analysis for FFG trial	Chapter 9 (344-366)	
<i>Jan. 28</i>	<i>Field trip: Fertilization and cabbage planting at FFG</i>		
Feb. 2	Phosphorus cycling and inputs	Chapter 5	
Feb. 4	Potassium cycling and inputs	Chapter 6	Due: PS1
Feb. 9	Plant nutrient sampling approaches and methods Exam 1 review session	Chapter 9 (311-335)	Due: 1 st fertility trial report
Feb. 11	Exam # 1: Soil and crop nutrition review, N & P cycles (up to 2/2)		
Feb. 16	Sulfur, calcium and magnesium Exam 1 review	Chapter 7	
Feb. 18	Micronutrients	Chapter 8	Posted: PS2 (Macro & micronutrients)
Feb. 23	Soil acidity & alkalinity	Chapter 3	
<i>Feb. 25</i>	<i>Recharge day (no class, but watch IFAS soil testing lab virtual field trip)</i>		Due: PS2
<i>March 2</i>	<i>Field trip: Crop health sampling at FFG (SPAD, crown diameter)</i>		
March 4	Exam # 2: K, Ca, Mg, S, micronutrients, soil acidity/salinity (2/4 to 2/23)		

March 9	Nutrient & management principles 5Rs	Chapters 10 (369-413), 11 (431-446)	
March 11	Soil salinity & sodicity Organic amendments Exam 2 review	Chapter 10 (413-424)	
<i>March 16</i>	<i>Field trip: Crop health sampling at FFG (SPAD, sap nutrients)</i>		
March 18	Livestock integration Soil conservation and management	Chapter 12 (455-480)	Posted: PS3 (organic amendments)
March 23	Crop rotation and cover crops Guest speaker: Dr. Tatiana Sanchez – Vegetable systems		
March 25	In-class activity: crop health analyses for FFG trial Environmental impacts	Chapter 12 (480-505)	Due: PS3
March 30	Best Management Practices (BMPs) Guest speaker: Dr. D. Kadyamkapeni – Citrus	Chapter 10 (426-429)	Posted: PS4 (BMPs, soil conservation)
April 1	BMPs in Florida Guest speaker: Dr. Mark Clark – P management in Florida		Due: 2 nd fertility trial report
April 6	<i>Field trip: Harvest and crop nutrient sampling at FFG</i>		
April 8	In-class activity: analysis of yields for FFG trial Guest speaker: Dr. A.J. Reisinger – Urban systems		Due: PS4
April 13	In-class activity: nutrient budgets for FFG trial		
April 15	Nutrient management in organic systems Biodynamic & other alternative systems		
April 20	Review session for final exam		Due 4/21: Final fertility trial report
April 29	Final cumulative exam (7:30 – 9:30)		