

## **SWS 4116/5115 – Environmental Nutrient Management (3 credits) Spring 2018**

### **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 while minimizing 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, and biosolids – can 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.

Prerequisite: SWS 3022 – Introduction to Soils in the Environment

### **Instructor**

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Telephone: 352-294-3159  
Office hours: Monday 12:30-2:00 PM, or by appointment

### **Course meeting times**

Tuesday and Thursday, 8:30-10:25, McCarty B G108

### **Course objectives**

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

1. Describe nutrient cycles for the main elements covered in the class: nitrogen, phosphorus, and potassium;
2. Explain how nutrients affect crop nutrition, recognize symptoms of deficiency, and relate crop nutrient demand to soil nutrient availability;
3. 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) on nutrient cycling;
4. Identify best management practices (BMPs) for different cropping systems, and evaluate their efficiency;
5. Contrast different approaches used to manage soil fertility: conventional, integrated, and organic;
6. Interpret soil and crop testing results, and make recommendations to maximize crop growth;
7. Design nutrient management plans based on different nutrient management approaches.

## Textbook (required)

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

Other materials (mostly papers from the primary literature and EDIS publications) will be provided to complement the main textbook.

## Course format

We will use a combination of methods to cover the material. Tuesdays will be devoted to lectures and short in-class activities, focusing on the general principles of soil fertility and nutrient management. Thursdays will typically (but not always) be used for active learning activities that will be more specific to nutrient management in Florida: field trips and sampling at the Field and Fork gardens (FFG) on campus, visits to the IFAS extension lab and pedometrics lab, and longer in-class activities (e.g., problem-based learning). Students are expected to meet at field trip locations (all on campus) on their own. Classes at the FFG will involve outside work where there is a large density of insects, including bees – dress appropriately and let me know of any history of allergic reactions to bees (or other relevant medical condition).

## Class attendance

It is highly recommended to attend all class meetings, including field trips. Student who miss class will be responsible to cover the material missed on their own. Also, 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. The final exam will take place on May 4, 2018, between 10:00 AM and 12:00 PM.

Late assignments will get a 10% deduction for each late day, up to 4 days. If the assignment is submitted on or after the 5<sup>th</sup> day of original submission, 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

	SWS 4116	SWS 5115
Mid-term exam (covers material up to that point)	25%	20%
Final exam (covers <b>all</b> material from the class)	30%	25%
Problem sets (6% each for SWS 4116; 4% each for SWS 5115)	30%	20%
Nutrient management plan (5% for draft; 10% for final)	15%	15%
Final paper (only for SWS 5115)	N/A	20%

## Grade scale

		B+	87 - 89.9	C+	77 - 79.9	D+	67 - 69.9	E	< 60
A	93 - 100	B	83 - 86.9	C	73 - 76.9	D	63 - 66.9		
A-	90 - 92.9	B-	80 - 82.9	C-	70 - 72.9	D-	60 - 62.9		

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

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

There will be time allocated in class to complete online evaluations on April 24.

### 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 (e.g. assignments, papers, quizzes, exams). 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: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.

### 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/](http://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/](http://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/](http://www.umatter.ufl.edu/)

3. *Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://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](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)

## Schedule

Date	Topic	Reading	Assignments
Jan. 9	Introduction	Havlin chapter 1	
Jan. 11	Plant-soil interactions, Nitrogen cycle	Havlin chapter 2, 4 (121-126, 140-165)	
Jan. 16	Nitrogen fertilizers, N-fixation	Havlin chapter 4 (126-140, 165-187)	
Jan. 18	<i>Field trip:</i> Soil sampling at FFG	Havlin chapter 9 (p. 336-344)	
Jan. 23	Phosphorus cycling and fertilizers	Havlin chapter 5	Due 1/23: Problem set (N cycle/fertilizers)
Jan. 25	<i>Field trip:</i> IFAS extension lab		
Jan. 30	Potassium cycling and fertilizers	Havlin chapter 6	
Feb. 1	<i>Field trip:</i> Pedometrics lab		
Feb. 6	Sulfur, calcium and magnesium	Havlin chapter 7	Due 2/6: Problem set (P, K cycle/fertilizers)
Feb. 8	Interpreting soil lab test results	Havlin chapter 9 (p. 344-366)	
Feb. 13	Micronutrients	Havlin chapter 8	
Feb. 15	<i>Field trip:</i> Nutrient deficiency experiments		
Feb. 20	Soil acidity and alkalinity	Havlin chapter 3	Due 2/20: Problem set (Lab testing)
Feb. 22	Analyzing FFG soil lab tests		
<b>Feb. 27</b>	<b>Mid-term exam (in class)</b>		
March 1	Exam review, Nutrient management plans		Due 3/4: Draft nutrient management plan
<b>Spring break (No classes on March 6 &amp; 8)</b>			
March 13	Nutrient management principles	Havlin chapter 10 (369-376), 11 (431-439)	Due 3/13: Paper outline (SWS5115 only)
March 15	<i>Field trip:</i> Plant nutrient sampling at FFG	Havlin chapter 9 (311-335)	
March 20	Organic amendments, livestock integration	Havlin chapter 10 (413-424), TBD	
March 22	Managing organic amendments	TBD	
March 27	Water management and 4Rs	Havlin chapter 10 (377-413), 11 (439-446)	Due 3/27: Problem set (organic amendments)
March 29	Crop rotation and soil management	Havlin chapter 12 (455-480)	
April 3	Environmental impacts	Havlin chapter 12 (480-505)	
April 5	Florida BMPs	Havlin chapter 10 (426-429), TBD	
April 10	Alternative cropping systems: organic, biodynamic, permaculture	TBD	Due 4/10: Problem set (environmental impacts and BMPs)
April 12	Integrated soil fertility management	TBD	
April 17	Nutrient management plans for FFG	Havlin chapter 11 (446-453)	
April 19	Interpretation of experimental data	TBD	
April 24	Review session for final exam		Due 4/27: Final nutrient management plan Due 4/30: Final paper (SWS5115 only)
<b>May 4</b>	<b>Final exam (10:00 - 12:00)</b>		