SWS 6136 – Soil fertility (3 credits)
Fall 2019

Course description

Principles of advanced soil fertility, including soil chemical properties, crop management practices, plant nutritional requirements, soil fertility amendments, and physiological aspects of plant growth.

Prerequisites: SWS 5050 – Soils for Environmental Professionals or instructor consent.

Instructor

Gabriel Maltais-Landry
Assistant Professor, Soil and Water Sciences Department
Email: maltaislandryg@ufl.edu
Office: G149 McCarty Hall A
Telephone: 352-294-3159
Office hours: by appointment

Course meeting times

Tuesday Period 2-3, Thursday period 3, McCarty B G108. Attendance from RECs via zoom on these periods is also possible.

Course objectives

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

1. Describe nutrient cycles and interactions among them, and how nutrients affect plant growth;
2. Describe how soil fertility is measured and how nutrient input recommendations are made;
3. Identify how different nutrient inputs and different nutrient management approaches affect soil fertility and plant growth;
4. Illustrate how soil fertility management is a critical component of sustainability, including soil health and best management practices (BMPs);
5. Apply key principles of soil fertility management to the thesis/dissertation study system.

Textbook

There is no textbook required for this class; all reading material will be provided. The following textbook is recommended as a good reference to cover the corresponding content before lectures and activities focusing on a specific topic.

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

Course format

The first period on Tuesday and the Thursday (8:30-9:20) will be allocated to lectures on nutrient cycling, soil fertility, and nutrient management. The second period on Tuesday (9:35-10:25) will typically be allocated to discussions on a specific topic, most often a review paper from the scientific literature, or other in-class activities.

Discussions. Seven papers will be posted on canvas at the beginning of the semester. Before the discussion period assigned to each paper, students will have to submit one post/question on the canvas discussion board *prior* to the in-person discussion. Following the in-person discussion, students will have to submit a 350 words (maximum) written summary of the discussion on canvas by the end of that week (except for the week of Thanksgiving when the summary is due the following Tuesday).

Quantitative activities. A full period will be used for students to get hands-on experience with different aspects of soil fertility (e.g., how to interpret a soil test). Students will have to turn in a brief report by the end of each period.

Semester-long paper. Students will write a paper focusing on soil fertility and nutrient management in their system of study. Within the first month of class, students will submit an outline of their paper to ensure they are on the right track. The final paper must be submitted before Thanksgiving break.

Exams. There will be one mid-term exam that will focus on the cycles and management of nitrogen, phosphorus and potassium. This exam will consist in a combination of multiple choices, short answers, and long answers. The final exam will cover materials from all the class and consist of a few essay questions.

Class attendance

Students must attend lectures and in-class activities in person (required for on-campus student) or via zoom (for REC students). Prior notification of absences (e.g., field work, conference) is required.

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 during the period allocated for finals, not in class (date and time TBA).

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 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

Mid-term exam (N, P, K cycles and management)	15%
Cumulative final exam	20%
Semester-long paper 1. Outline (due 9/20) 2. Final paper (due 11/26)	20% 5% 15%
Discussions (7 during the semester) 1. Pre-discussion questions 2. Post-discussion summaries 3. Participation to discussions	33% 7% 21% 5%
Quantitative in-class activities (4 during the semester)	12%

Grade scale

A	94 - 100
A-	90 - 93.9
B+	86 - 89.9
B	82 - 85.9
B-	78 - 81.9
C+	75 - 77.9
C	72 - 74.9
C-	69 - 71.9
D+	65 - 68.9
D	60 - 64.9
E	< 55

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 the last day of class (Dec. 3).

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. **All assignments for this class are individual assignments.** 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

Date	Topic	In-class activity (Tuesdays, period 3)
Aug. 20	Introduction and class logistics	Lecture - Review of crop physiology
Aug. 22	Review of crop nutrition	
Aug. 27	Review of key soil properties	Lecture – Review of key soil properties
Aug. 29	Review of soil acidity and liming	
Sept. 3	N cycle: fixation, mineralization, nitrification	Discussion #1: N stable isotopes
Sept. 5	N losses: leaching, volatilization, denitrification	
Sept. 10	N fertilizers	Discussion #2: N fertilizers
Sept. 12	N in organic amendments	
Sept. 17	N cycling through residues, livestock	Discussion #3: N credits from legumes
Sept. 19	P cycle and soil reactions	
Sept. 24	P biological cycling	Discussion #4: Soil P quantification methods
Sept. 26	P fertilizers	
Oct. 1	P inputs through organic amendments	Quantitative activity #1: P & organic amendments
Oct. 3	K cycle	
Oct. 8	K inputs and management	Quantitative activity #2: Mineralization curves
Oct. 10	Sulfur	
Oct. 15	**Mid-term exam: N, P, K cycles and management**	
Oct. 17	Calcium and magnesium	
Oct. 22	Micronutrients	Mid-term exam review
Oct. 24	Nutrient management and the 4Rs	
Oct. 29	The 5th R: water management	Discussion #5: 4Rs
Oct. 31	Soil and tissue testing methods	
Nov. 5	Fertility trials and input recommendations	Quantitative activity #3: Soil tests and fertility trials
Nov. 7	Emerging soil and tissue testing methods	
Nov. 12	Nutrient-use efficiency, nutrient budgets	Quantitative activity #4: NUE and nutrient budgets
Nov. 14	Best management practices (BMPs)	
Nov. 19	Soil organic matter (SOM)	Discussion #6: New paradigms in SOM
Nov. 21	Soil fertility and soil health	
Nov. 26	Nutrient management in organic systems	Discussion #7: Organic vs. conventional
Nov. 28	**Thanksgiving break**	
Dec. 3	Review session for final exam	
TBA	**Final exam**	