

Soil and Nutrient Diagnostics for Agricultural Production

Course No: SWS 6136

Credits: 3.0 hours Summer Semester Distance Education Mode

Instructor: Dr. Rao Mylavarapu

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(352)-294-3113

Office hours: Tuesdays, 2-4pm or Email for online appointment

Course location: Online

Meeting times: This course will be asynchronous (i.e., weekly lectures on Canvas) with periodic chat sessions as announced on specific weekdays, generally timed before and after all Tests and Project assignments, starting at 6PM.

COURSE DESCRIPTION: Nutrient management using basic soil fertility concepts supported by scientific diagnostic techniques in various soils and cropping systems in Florida and beyond will be discussed. Comprehensive information on individual and combined plant nutrients, interactions, and strategies to improve nutrient efficiencies will be presented in detail. Emphasis on nutrient budgeting to reflect specific cropping and management system, and the surrounding ecosystem will be emphasized to achieve agricultural best management practices for agronomic and environmental sustainability.

ADDITIONAL INFORMATION: This course is designed to serve as a capstone course in soil fertility and field nutrient management for graduate students from all majors summarizing nutrient properties and interactions in various soils and cropping systems. Examples with digital illustrations and animations will be presented to help visualization of various scenarios for agronomic and horticultural cropping systems are included. Scientific methods for prediction and diagnosis to include soil testing, NIR and MIR techniques, remote sensing of soil nutrient concentrations availabilities in the natural systems to plant systems will be discussed. Discussions on the 4-Rs approach of management and agricultural best management practices will be included. Use of AI to manage agricultural and natural systems will be introduced. Negative impacts on the environment from land management and possible mitigation methods will be identified.

COURSE LEARNING OBJECTIVES: The course will summarize and present nutrient management concepts as tools for effective field applications to include soils, nutrients, crops, 4Rs, BMPs for comprehensive sustainability. By the end of the course the students will be able to-

- Distinguish the simple and the complex interactions among individual nutrients and sources with basic soil parameters leading to plant nutrient uptake efficiencies
- Determine the specificity of different field and lab diagnostic methods to different soil and nutrient parameters and interpret soil nutrient levels and their corresponding plant availabilities
- Identify tools for nutrient assessments, nutrient budgets and loss mitigations in the agricultural

- fields with different management options
- Design field management plans for soils, nutrients and crops through hands-on practicum work and report-writing

DELIVERY METHOD: 100% Online. Online lectures with chat session.

Online lectures (PowerPoint presentations) and other course materials delivered through the Canvas ELearning System.

PRE-REQUISITES/CO-REQUISITES: SWS3022

COURSE SCHEDULE:

WEEK	WEEK START DATE	CHAT SESSION (6pm)	TOPICS	ACTIVITIES
1	5/12	5/13	Introduction & Scope Review of Soil Physical and Chemical Properties	Lectures 1-4
2	5/19		Popular N Sources and Management Popular P and K Formulations and Management	Lectures 5-10, Readings
3	5/26		Secondary and Micronutrient Sources and Management	Lectures 11-14, Readings
4	6/2	6/5	Introduction to Field Soil Management & Techniques Field Nutrient Management for Agronomic Crops TEST I	Lectures 15-16, Readings, Test 1
5	6/9		Field Nutrient Management for Horticultural Crops Agricultural Soils of Florida	Lectures 17-20, Readings

6	6/16	6/18	Predictive and Diagnostic Tools for Agriculture Soil Testing, Interpretation and Nutrient Recommendations	Lectures 21-24, Readings
7	6/23	-	UF Summer Break (June 23 th – June 27 th)	
WEEK	WEEK START DATE	CHAT SESSION (6pm)	TOPICS	ACTIVITIES
8	6/30	7/3	Nutrient diagnostics using NIR and MIR techniques and remote sensing Soil pH, Lime Requirement and Management, and Lime Laws MID-TERM EXAM	Lectures 25-28, Readings, Mid-Term Exam
9	7/7	7/10	Organic and Waste Nutrient Sources & Management	Lectures 29-33, Readings
10	7/14	7/17	TEST II Fertilizer, Formulations and Calculations 4Rs – Agricultural BMPs Course Review, Summary and Discussions	Test II , Lectures 34-39, Readings
11	7/21	7/24	Field and Lab- Practicum	Project assignment
12	7/29	8/1	Field and Lab- Practicum	Project assignment
13	8/5	-	FINAL EXAM	Project due, Exam

REQUIRED BOOK:

Soil Fertility and Fertilizers (John L. Havlin, Samuel L. Tisdale, Werner L. Nelson James D. Beaton, 2013)

ISBN-13: 978-0-13-305569-6

Handouts of research and extension journal articles on various topics

RECOMMENDED BOOKS:

Additional texts that may be useful include: *Plant Nutrition and Soil Fertility Manual* (Jones, 2012), *Soils and Soil Fertility* (Troeh and Thompson, 2016) and *Soils in our Environment* (Gardiner and Miller, 2007).

STUDENT EXPECTATIONS:

You are expected to attend and be prepared to participate in all chat sessions. You are expected to have meaningful participation in the chat sessions, demonstrated student interest, and overall student dedication.

STUDENT EVALUATION:

Assessments include two tests, a midterm exam, a final exam, and a project report. For the Practicum Project, individual project work is assigned and appropriate soil test reports are provided to students; students will identify the tests, analytical procedures and instrumentation, interpretation and methods, recommendations reported and combine them with the nutrient sources and respective management learnt in the classes, and align them with the provided site-specific field characteristics, select suitable crop(s) and develop a comprehensive soil, nutrient and crop management plan for the season chosen; and provide a discussion and summary on estimated yields, environmental impacts and overall sustainability.

Course grades will be determined as follows (%):

Evaluation endpoint	% of total grade
Test 1	10
Mid-term Exam	20
Test 2	10
Practicum-Project and Report	40
Final Exam	20

Grading Scale

A	93.0% and above	C	73.0-76.99%
A-	90.0-92.99%	C-	70.0-72.99%
B+	87.0-89.99%	D+	67.0-69.99%
B	83.0-86.99%	D	63.0-66.99%
B-	80.0-82.99%	D-	60.0-62.99%
C+	77.0-79.99%	E	Below 60.0

Grades and Grade Points

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

ATTENDANCE AND MAKE-UP WORK. Attendance at chat sessions is required. Class attendance, makeup exams, assignments and other work will follow UF policies found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

PRIVACY STATEMENTS FOR ONLINE COURSES

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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. 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/>

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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/process/student-conduct-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, <https://disability.ufl.edu>

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.

- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu
Counseling Services

Groups and Workshops

Outreach and Consultation Self-Help

Library

Wellness Coaching

- U Matter We Care, www.umatter.ufl.edu/
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>
- Student Success Initiative, <http://studentsuccess.ufl.edu>

Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>

Academic Resources

E-learning technical support: Contact the [UF Computing Help Desk](mailto:helpdesk@ufl.edu) at 352-392-4357 or via e-mail at helpdesk@ufl.edu

[Career Connections Center](#): Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services

[Library Support](#): Various ways to receive assistance with respect to using the libraries or finding resources

[Teaching Center](#): Broward Hall, 352-392-2010 or to make an appointment 352-392-6420 General study skills and tutoring.

[Writing Studio](#): 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers

Student Complaints On-Campus: [Visit the Student Honor Code and Student Conduct Code webpage for more information](#)

On-Line Students Complaints: [View the Distance Learning Student Complaint Process](#)