

Environmental Crop Nutrition - Web

AGR 6422C (3 Credits) – Fall 2023

Professor: Dr. William M. Hammond

Agronomy Department

Phone: 352-294-3792 (office)

Email: williamhammond@ufl.edu

Course description: Study of environmentally sound nutrient management strategies. During this course, the effects of environmental conditions and nutrient management on crop production and environmental quality will be outlined. This course is intended to bridge theoretical aspects of plant mineral nutrition and practical applicability of basic principles of fertilization.

General course objectives: 1) Discuss root growth and nutrient uptake dynamics; 2) Outline the function of nutrients in plants; 3) Present methods for assessment of crop nutrient status and diagnosis of plant deficiency and toxicity symptoms; 4) Discuss the use of irrigation and nutrient budgets for agricultural crops; 5) Outline crop nutrient concentrations and requirements for selected crops; 6) Describe interactive environmental and biological processes that control crop nutrient uptake and potential nutrient losses; 7) Develop nutrient related Best Management Practices (BMP's) and/or crop nutrient management plans for cropping systems.

Class Schedule: Course content is delivered in E-learning Canvas and is typically available asynchronously, except for potential discussion/chat sessions.

Office Hours: As this course is online and asynchronous, students are encouraged to contact the instructor by email (williamhammond@ufl.edu) or by phone (office: 352-294-3792) as needed to address questions regarding course content and management. Interactive video conference sessions (Zoom, Teams) are also available!

Instructional approach: This course has been constructed based off course material previously taught by Dr. John Erickson. If you are having any problems with the course or need assistance, don't wait until late in the semester to contact the instructor. The sooner we begin to address the problem, the more likely you will achieve a satisfactory outcome.

This is a fully online course delivered in E-Learning Canvas, the centrally supported course management system at UF. Canvas is the online source for the majority of your learning

resources, assignments, and grades in this course. It can also be used for interacting with the professor and other students in the course. For a tutorial regarding E-Learning Canvas functionality, go to <https://lss.at.ufl.edu/>. ([Links to an external site.](#)) If you need help resolving any other technical issues that can't be resolved by contacting the instructor, you can contact the UF help desk at <http://helpdesk.ufl.edu>.

Students enrolled in the course (note: you must be enrolled in the course to access course materials) should login to Canvas on the first day of the semester at the address above. You will need your gatorlink username and password to login to Canvas.

There will be **no required textbook**. I will use a number of textbooks, including those listed below. Excerpts from these texts and other additional readings from the primary literature for the course will provided through Canvas.

- Fageria, NK. 2009. *The use of nutrients in crop plants*. CRC Press. Boca Raton, FL.
- Barker, AV and DJ Pilbeam. 2007. *Handbook of Plant Nutrition*. CRC Press, Boca Raton, FL.
- Marschner, P. 2012. *Mineral Nutrition of Higher Plants*. Elsevier, Waltham, MA.

All learning modules, assigned readings, video lectures, and other course content will be posted in Canvas. Assignments and discussion questions will be provided in the “Assignments” and "Discussions" section of Canvas, but can also be linked to from the modules.

Assignments and discussion questions will be posted with an expected due date. Quizzes will be available in Canvas for about a 1-week period as scheduled in your syllabus and once started you will have a fixed amount of time to complete the quiz. The quizzes will emphasize the material covered in the preceding section, but some material will be comprehensive. The Exam at the end of the course will cover all course content. Quizzes and exams will be closed book (any necessary formulas/equations will be provided in the exam) and you must finish within the allotted time. You will not receive any credit for unanswered questions, so plan your time well.

Required readings: (note, additional optional readings are provided in each module of the course)

- [Long-distance Transport in the Xylem and Phloem](#), chapter 3 from Marschner's Mineral Nutrition of Higher Plants is required reading. This is excellent reading that covers the movement of nutrients within the plant in detail. However, don't get bogged down in the biochemical detail, such as transporter families, but focus on a deeper, conceptual understanding of how transport and movement of nutrients in the plant occurs
- [Effect of Internal and External Factors on Root Growth and Development](#), Chapter 13 in Marschner's Mineral Nutrition of Plants (3rd Edition) is required reading.
- [Nickel](#), chapter 14 from Handbook of Plant Nutrition by Fageria (2001) is required reading.

- [Improving N use efficiency for cereal production](#), by Raun and Johnson (1999), is required reading and presents a nice easy to read discussion regarding efficient nutrient use in cereal crop production.
- [Fertilizer application](#), Chapter 6 in the Principles of Plant Nutrition text by Mengel and Kirkby (2001) is required reading.

Interactive Literature Discussion Assignment:

During Section 6 of the course (specificially, between the dates of November 13th and November 18th) there will be a 1-hour literature discussion held via Zoom. Dr. Hammond will organize the date and time of this interactive discussion during the first few weeks of class, and will update the Home Page and send a message via Canvas to all students regarding the scheduled day/time. The paper to be discussed will be assigned October 15th, to provide students time to read the article prior to the interactive discussion, so they may come prepared to contribute to the discussion. This literature discussion counts as a 25-point assignment, and will be graded on participation.

Interactive Discussion Replies:

Discussions begin in Section 3, through Section 7. As this is an online asynchronous class, the Discussion board is an important opportunity to interact with your classmates. Each student is responsible for posting a substantive original response to the week's discussion, to earn up to 5 points per discussion. Students are highly encouraged to post substantive replies (expand on the provided solutions, recommend additional steps, provide an alternate solution / point of view). Each substantive reply (note, "I like this post", "great post!", "I agree", "I found the same issue" are not substantive) will result in 1 **extra credit** point, and students may earn up to 4 extra credit points per discussion by replying to up to 4 classmates. Thus, if a student replied substantively to 4 discussion posts during each of the 5 discussions, they **may earn up to a total of 20 extra credit points** in the class.

Course Schedule:

Dates open:	Modules, Assignments, and Quizzes:	Important Dates:
Section 1	Read the Syllabus!	Introduce yourself on discussion board by Sept. 2 nd .
23 Aug –	Introduction to Crop Nutrition	Quiz 1 due Sept 2 nd
02 Sept	Introduce yourself!	

	Nitrogen (N) Copper (Cu) Section 1 Quiz (opens Aug 27th)	
Section 2 03 Sept – 16 Sept	Phosphorous (P) Chlorine (Cl) Nutrient Uptake I: In the Soil Nutrient Uptake II: In the Plant Section 2 Quiz (opens Sept 10th) Nutrient Management Plan	Section 2 quiz due Sept 16 th
Section 3 17 Sept – 30 Sept	Potassium (K) Plant Root Systems Nickel (Ni) Discussion Question #1 Section 3 Quiz (opens Sept 24th)	Section 3 quiz due Sept 30 th Discussion Question #1 due Sept 30 th
Section 4 01 Oct – 14 Oct	Sulfur (S) Sulfur Management for Agronomic Crops Crop Nutrient-Use Efficiencies Boron (B) Discussion Question #2 Section 4 Quiz (opens Oct 8th)	Section 4 quiz due Oct 14 th Discussion Question #2 due Oct 14 th Sulfur Management writing reflection for extra credit - due Oct 14 th
Section 5 15 Oct –	Molybdenum (Mo) Crop Nutrient Requirement Calcium (Ca)	Section 5 quiz due Oct 28 th Discussion Question #3 due Oct 28 th Read assigned literature discussion paper, prepare for

28 Oct	Nutrients an Irrigation Management Discussion Question #3 Section 5 Quiz (opens July Oct 22 nd) Literature discussion paper assigned.	upcoming interactive discussion.
Section 6 29 Oct – 18 Nov	Magnesium (Mg) Fertilizer Application Methods Iron (Fe) Discussion Question #4 Section 6 Quiz (opens Nov 12 th) Interactive Literature Discussion (date/time will be provided after poll results in first few weeks of class).	Section 6 quiz due Nov 18 th Discussion Question #4 due Nov 18 th Nutrient Management Plan Due Nov 18 th Literature discussion (date/time in link).
Section 7 19 Nov – 06 Dec	Manganese (Mn) Nutrition and Disease Zinc (Zn) Discussion Question #5 Section 7 Quiz (opens Dec 1 st)	Section 7 quiz due Dec 6 th Discussion Question #5 due Dec 6 th
EXAM 10 Dec – 12 Dec	Final Exam (opens December 10 th)	Exam is due December 12 th .

Attendance: Students are responsible for understanding all material provided through Canvas. Students are also responsible for meeting deadlines for assignments, quizzes, exams, etc. as indicated in the course schedule. There will be no make-up quizzes, exams, or assignments except for excused absences. Make-up work should be arranged prior to the excused absence if possible (e.g., university-sanctioned events), or as soon as possible for unexpected excused absences (e.g., illness or death in the immediate family).

Student Evaluation & Grading: There will be a total of 625 points for the class. Seven quizzes available at the end of each section will count 50 points each for a total of 350 points.

Assignments include the five discussion question focused on identifying nutrient deficiencies will count 10 points each for a total of 50 points. An interactive literature discussion will be worth 25 points, based on participation in the discussion. You will also be required to submit a written nutrient management plan worth 100 points and a final exam worth 100 points. Extra credit (up to 20 points) is available via discussion replies, see "Interactive Discussion Replies" section for details, above. Additional opportunities for extra credit include a reflection writing on a guest-lecture regarding Sulfur management.

Item	Points
Quizzes	350
Assignments	50
Literature Discussion	25
Nutrient Management Plan	100
Exam	100
Total:	625
	up to +20
Interactive Discussion Replies	(extra credit)

Assigned discussion questions, quizzes, the interactive literature discussion, the nutrient management plan, and the exam will be graded based on completeness, conciseness, clarity, effort, organization, originality, and timeliness. Late work will not be accepted without an excused absence. Please contact instructor as soon as possible if you have an excused absence planned.

Students attaining the following percentages are guaranteed at least the following grades:

A 93 - 100%	A- 90 - 92%	B+ 87 - 89%	B 83 - 86%
B- 80 - 82%	C+ 77 - 79	C 73 - 76%	C- 70 - 72%

D+ 67 – 69%

D 63 – 66%

D- 60 – 62%

E <60%

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> (Links to an external site.)

Online Course Evaluation

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/> (Links to an external site.). 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/> (Links to an external site.). Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/> (Links to an external site.).

Accommodations for Students with Disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu/> (Links to an external site.)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Academic Honesty

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. 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.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/> (Links to an external site.)) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

Campus Resources

Health and Wellness

- *U Matter, We Care*: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392- 1575 so that a team member can reach out to the student.
- *Counseling and Wellness Center*: [https://counseling.ufl.edu/\(Links to an external site.\)](https://counseling.ufl.edu/(Links to an external site.)), 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
- Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the [Student Health Care Center website](#).
- *Sexual Assault Recovery Services (SARS)*: Student Health Care Center, 392-1161.
- *University Police Department*: 392-1111 (or 9-1-1 for emergencies). [http://police.ufl.edu/\(Links to an external site.\)](http://police.ufl.edu/(Links to an external site.))
- GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

Academic Resources

- *E-learning technical support*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. [https://lss.at.ufl.edu/help.shtml\(Links to an external site.\)](https://lss.at.ufl.edu/help.shtml(Links to an external site.)).
- *Career Connections Center*, Reitz Union, 392-1601. Career assistance and counseling. [https://career.ufl.edu/\(Links to an external site.\)](https://career.ufl.edu/(Links to an external site.))
- *Library Support*, [http://cms.uflib.ufl.edu/ask\(Links to an external site.\)](http://cms.uflib.ufl.edu/ask(Links to an external site.)). Various ways to receive assistance with respect to using the libraries or finding resources.
- *Teaching Center*, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. [http://teachingcenter.ufl.edu/\(Links to an external site.\)](http://teachingcenter.ufl.edu/(Links to an external site.))
- *Writing Studio*, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>
- *Student Complaints On-Campus*: [https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/\(Links to an external site.\)](https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/(Links to an external site.))
- *On-Line Students Complaints*: <http://distance.ufl.edu/student-complaint-process/>

In-Class Recording:

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.