Workshop 2023: R2M rapid risk assessment for diseases and pests of banana in Colombia and rice in Nepal

PLP 4932

A CURE (Course-based Undergraduate Research Experience) course

Fall Semester 2023

3 credit hours

In this course we will apply tools for rapid disease and pest risk assessment and mitigation planning for crop production systems at the national or regional level (garrettlab.com/r2m). Our focus this semester will be on banana in Colombia and rice in Nepal. The results of these analyses are designed to help countries advance their strategies for effective management of crop disease, as well as invasive pest management, as building blocks in the development of a global surveillance and mitigation system for crop disease. We will develop these analyses in peer-reviewed journal articles in collaboration with scientists in Colombia and Nepal and in the CGIAR (cgiar.org/).

Class meetings

➢ Course will often meet jointly with PLP6701 (Impact through Networks), which meets as follows:
    Class times: TR Period 5 (11:45 am -12:35 pm US Eastern)
    Classroom for students in Gainesville: 2564 Fifield Hall
    Course link for students outside Gainesville will be in Zoom: TBA

➢ Meeting times for the undergraduate course PLP4932 to be determined based on participants' schedules
➢ Virtual course access link: TBA

For participants outside the US: Note that, in the US, Daylight Saving Time ends Sunday, Nov 5, 2023, so the time zone of the course will change from Greenwich Mean Time minus four (GMT-4) to GMT-5, and the course will effectively be one hour later if your location doesn't change time. For participants in the US Eastern time zone, the course will continue to be 11:45-12:35.)

Research assistantship: The UF undergraduate participants in the workshop will be selected through a competitive application process and will each receive a $2000 workshop assistantship for the semester. During the last 10 weeks of the semester, participants are expected to contribute to the workshop projects during at least 10 hr/week work in the lab beyond typical course participation, as a responsibility associated with the assistantship.

Prerequisites: An accepted application through the process described below. Junior or Senior status. Residence in Gainesville and eligibility to work at least 10 hr/week at University of Florida. Course work and/or experience in at least one of the following areas: biology/agriculture, economics/social science, and coding/modeling.

Application process: Review of applications will begin August 10, 2023. A subset of applicants will be contacted for brief interviews shortly thereafter. All applicants who submitted a complete application will learn the outcome of their application before August 21, 2023. Information about the application process is available at https://www.garrettlab.com/r2m-workshop-fall-2023/ .
(Note that course registration in Fall 2023 should be complete by Aug 29 to avoid added fees, according to https://catalog.ufl.edu/UGRD/dates-deadlines/2023-2024/#fall23texthttps://catalog.ufl.edu/UGRD/dates-deadlines/2022-2023/)

Instructors

Dr. Karen A. Garrett (garrettlab.com)
Plant Pathology, Global Food Systems Institute, Emerging Pathogens Institute
Office: 2411 Fifield Hall
Email: karengarrett@ufl.edu

Co-Instructors
Dr. Ashish Adhikari (adhikariashish@ufl.edu), Postdoctoral Scientist
Dr. Manoj Choudhury (m.choudhary@ufl.edu), Postdoctoral Scientist
Berea A. Etherton (betherton@ufl.edu), Graduate Research Assistant
Dr. Romaric A. Mouafo-Tchinda (rmouafotchinda@ufl.edu), Postdoctoral Scientist
Dr. Ravin Poudel, Collaborator
Aaron I. Plex Sulá (plexaaron@ufl.edu), Graduate Research Assistant
Jacobo Robledo (jacoborobledobur@ufl.edu), Graduate Research Assistant

Course materials access: invitation to Teams will be provided to participants

Office hours: To be arranged based on participants' schedules

Course overview

In this course we will apply R2M tools for rapid risk assessment for mitigation of crop diseases and pests (garrettlab.com/r2m) and publish the resulting analyses in peer-reviewed scientific journals. Our focus for Fall 2023 will be banana in Colombia and rice in Nepal. These analyses will help countries develop their strategies for effective management of crop diseases and pests, as building blocks in the development of a global surveillance and mitigation system for crop disease.

As a team, students will contribute to these analyses. Based on students' experience and interests, they may take the roles of biologists/agriculturalists, economists/social scientists, and/or coders/modelers in contributing to the projects. Students will gain experience using the R programming environment, though not every student will need to work on the code for the projects. Students will collaborate with more experienced research mentors in the Garrett Lab.

The project will be developed in collaboration with scientists in the CGIAR (https://www.cgiar.org/) in Bioversity and the International Center for Tropical Agricultural (https://www.cgiar.org/research/center/alliance-bioversity-ciat/) and in the International Rice Research Institute (https://www.irri.org/). We will collaborate with scientists in national programs and universities, such as AGROSAVIA (https://www.agrosavia.co/) and University of Magdalena in Colombia and NARC and Tribhuvan University in Nepal.

We will also work on improving these rapid risk assessment tools in collaboration with scientists in USDA APHIS (https://www.aphis.usda.gov/aphis/home/) working on protecting food production in the US from new pathogens and pests.

We will be applying and building on earlier versions of risk and mitigation assessment tools in projects such as the following:

Andersen et al. 2019. Modeling epidemics in seed systems and landscapes to guide management strategies: The case of sweetpotato in Northern Uganda. Phytopathology 109:1519-1532. [open access link]

Andersen Onofre et al. 2021. An integrated seed health strategy and phytosanitary risk assessment: potato in the Republic of Georgia. Agricultural Systems 191:103144. [open access link]

Buddenhagen et al. 2022. Where to invest project efforts for greater benefit: A framework for management performance mapping with examples for potato seed health. Phytopathology. [open access link]

Carvajal-Yepes et al. 2019. A global surveillance system for crop diseases. Science 364:1237-1239. [link]

Etherton, B. A., R. A. Choudhury, R. I. Alcalá-Briseño, Y. Xing, A. I. Plex Sulá, D. Carrillo, J. Wasielewski, L. Stelinski, K. A. Grogan, F. Ballen, T. Blare, J. Crane, and K. A. Garrett. 2023. Are avocados toast? A framework to analyze decision-making for emerging epidemics, applied to laurel wilt. Agricultural Systems 206:103615. [open access link]

Garrett. 2021. Impact network analysis and the INA R package: Decision support for regional management interventions. Methods in Ecology and Evolution 12:1634-1647. [open access link]

Garrett et al. 2022. Climate change effects on pathogen emergence: artificial intelligence to translate big data for mitigation. Annual Review of Phytopathology. [link]

Thomas-Sharma et al. 2017. A risk assessment framework for seed degeneration: Informing an integrated seed health strategy for vegetatively-propagated crops. Phytopathology 107:1123-1135. [open access link] [Interactive interface for exploring model behavior]

Xing et al. 2020. Global cropland connectivity: A risk factor for invasion and saturation by emerging pathogens and pests. BioScience 70:744-758. [open access link]

Course learning objectives

Participants who have completed this course will be able to …

➢ ***Prepare a scientific manuscript for future submission to a peer-reviewed journal***
➢ Prepare annotated bibliographies as part of the process of developing scientific manuscripts
➢ Use the R programming environment for data analysis and presentation of results
➢ Provide feedback on the development of scientific manuscripts to collaborators
➢ Work in an interdisciplinary team

Course outline (*as of 1 August 2023 – subject to minor changes*)

Course assignments to be turned in or presented by students are indicated in bold

Note that this course meets simultaneously with PLP 6701, Impact through Networks, during much of the semester (TR Period 5 (11:45 am -12:35 pm US Eastern), ***but has different assignments***. PLP 6701 will provide background in network analysis applications that will be used in the projects in PLP 4932.

Week of	**Course meetings with PLP 6701**	**PLP 4932 workshop activities**
Aug 24	Introduction: network analysis and PLP 6701	Introduction to the workshop in PLP 4932
Aug 29, 31	Introduction to R programming environment	**Weekly update** on concepts and plans: overview of banana health

		in Colombia and rice health in Nepal, part 1
Sept 5, 7	Epidemic and invasion networks, and habitat connectivity (cropland connectivity)	**Weekly update** on concepts and plans: <u>overview</u> of banana health in Colombia and rice health in Nepal, part 2
Sept 12, 14	Epidemic and invasion networks, and risk from trade networks	**Weekly update** on concepts and plans: first draft of <u>cropland connectivity</u> analysis
Sept 19, 21	Visualizing and describing networks	**Weekly update** on concepts and plans: first draft of <u>trade network</u> analysis
Sept 26, 28	Impact network analysis **Update about PLP4932 results in PLP6701**	**Weekly update** on concepts and plans: plans for <u>expert knowledge elicitation</u> (EKE)
Oct 3, 5	Ecological networks	**Weekly update** on drafts of text and code: first draft of all <u>cropland connectivity</u> sections
Oct 10, 12	Gene networks and social networks	**Weekly update** on drafts of text and code: first draft of all <u>trade network</u> sections *Week 1 of 10 weeks of research assistantship*
Oct 17, 19	Microbiome networks	**Weekly update** on concepts and plans: plans for <u>impact network analysis</u> (INA)
Oct 24, 26	Mathematical models of networks	**Weekly update** on concepts and plans: first draft of <u>impact network analysis</u>
Oct 31, Nov 2	Networks and meta-populations in landscapes **Update about PLP4932 results in PLP6701**	**Weekly update** on drafts of text and code: first draft of all <u>impact network analysis</u> sections
Nov 7, 9	Bayesian networks	**Weekly update** on concepts and plans: first draft of <u>expert knowledge elicitation</u> analyses

Nov 14, 16	Exponential random graph models (ERGMs)	**Weekly update** on drafts of text and code: first draft of all <u>expert knowledge elicitation</u> sections
Nov 21, 23	No meetings with PLP6701: instead, meetings within PLP4932 to work on manuscript	**Weekly update** on drafts of text and code: first draft of manuscript sections
Nov 23, 25	Meetings within PLP4932 to work on manuscript; no meetings with PLP6701	**Review of manuscript drafts** *--- Thanksgiving vacation*
Nov 28, 30	Meetings within PLP4932 to work on manuscript; no meetings with PLP6701	**Weekly update** on project iterations incorporating review by team members
Dec 5, 7	**Update about PLP4932 results in PLP6701**	****Project results presented to stakeholders in Colombia and Nepal**
Finals week		**Finalize manuscript drafts**

Weekly updates, including a 3-minute update per person in the weekly meeting: Each student will provide a weekly report outlining their contributions to the project.

Workshop team structure: The team will include students working on biology/agriculture, economics/social sciences, and/or coding/modeling.

Authorship: The workshop is designed to give students experience in being an author on a scientific paper. Students will not automatically be granted authorship; authorship criteria will be discussed in the class. The order of authorship will be determined based on the level of contributions of the authors, including their contributions through finalizing the manuscript for submission to a journal and through the revisions of the manuscript <u>after the workshop is over</u>.

Grading

10% Workshop discussions
30% Weekly updates to project
10% Feedback provided to colleagues for improving their components
20% Contributions to first complete draft of project materials
30% Contributions to final version of project materials

Workshop discussions. When discussing the workshop projects, all participants are expected to contribute questions and ideas, and feedback for others' ideas. Discussions are evaluated based on a course rubric for contributing to discussions.

Weekly updates. Participants will prepare a weekly update to the group based on their contributions that week to the project draft materials. For example, early in the semester these updates might be outlines and concepts, and later in the semester the updates would be iterative improvements to more refined text, illustrations, and analyses.

Contributions to final version of projects. Participants will revise the sections of the project material for which they are responsible, based on feedback from the group. At this stage, all the project components should be in final shape.
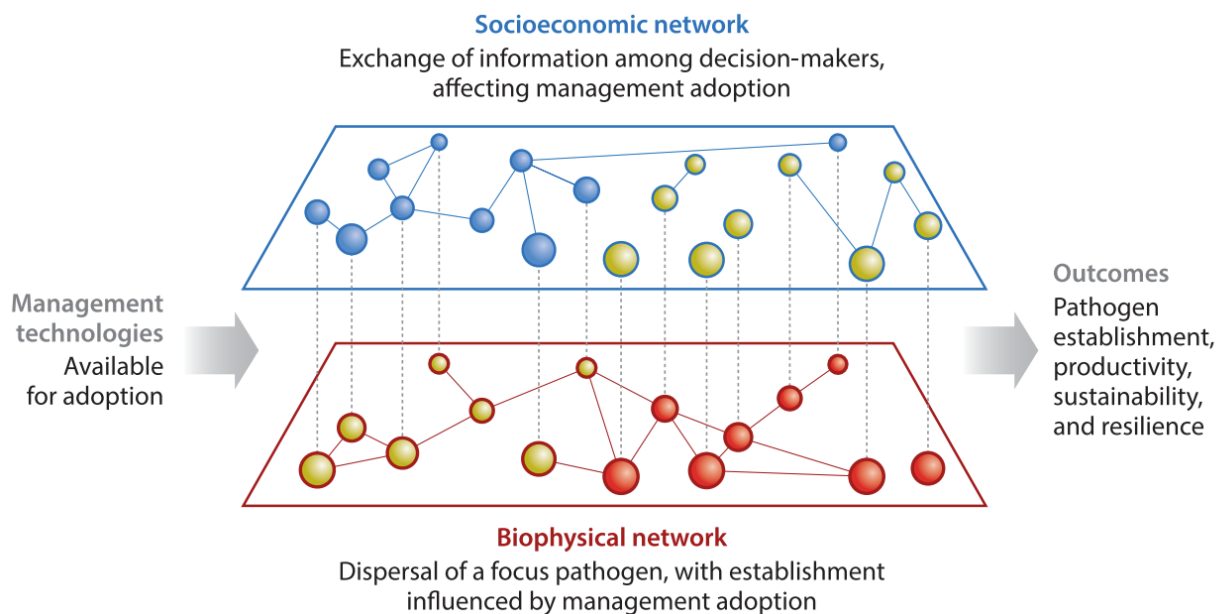
If the grade on an assignment appears incorrect, the process for requesting reconsideration of the grade is to prepare a written statement describing where the error lies, to be turned into the instructor within one week of receiving the grade.

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/.

Grading scale: 94-100 A; 90-93.99 A-; 87-89.99 B+; 84-86.99 B; 80-83.99 B-; 77-79.99 C+; 74-76.99 C; 70-73.99 C-; 67-69.99 D+; 64-66.99 D; 60-63.99 D-; 0-59.99 E

Required course materials

There is no required textbook for this course. Materials for discussion will be provided to the class.

Socioeconomic network
Exchange of information among decision-makers, affecting management adoption

Management technologies Available for adoption

Outcomes Pathogen establishment, productivity, sustainability, and resilience

Biophysical network
Dispersal of a focus pathogen, with establishment influenced by management adoption

One tool we will use is impact network analysis for multilayer social-ecological network analysis, with references and links above (Etherton et al. 2023, Garrett 2021).

Attendance and make-up policies

This is a synchronous course, to make the most of interactions among participants. Discussion among course participants is an important part of the learning experience, so attendance is required. Three course meetings can be missed without explanation (with the exception of dates when the participant has a particular responsibility, such as leading discussions or presenting). Please alert the instructor if there is a serious health problem or other emergency.

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

Accommodations 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/

Recorded class sessions

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.

Online course evaluation

For this course, we will also ask students to anonymously provide some more specific recommendations for making the course as useful and interesting as possible, in both a

mid-term survey and a final survey. This will be in addition to the general UF course assessment.

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/.

Materials and supplies fees

None

UF Policy on 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.

UF Policy on 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.

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

If there is an issue in the course, please bring it to the instructor's attention. UF policies about more serious complaints are described in these documents.

• Residential Course: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/
• Online Course: https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint