

Workshop 2022: Meta-tool development for rapid assessment of national risk of crop diseases and pests

PLP 4932

A CURE (Course-based Undergraduate Research Experience) course

Fall Semester 2022

3 credit hours

In this course we will develop and publish tools for rapid disease risk assessment and mitigation planning for crop production systems at the national or regional level. These tools will help countries develop 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 are developing 'meta-tools' in the sense that national programs can use these meta-tools to create their own tools for evaluating risk and mitigation strategies.

Class meetings

- Meeting times to be determined based on participants' schedules
- Virtual course access link: TBA

Assistantship: The participants in the workshop will be selected through a competitive application process and will each receive a \$2000 workshop assistantship for the semester. Participants are expected to contribute to the workshop projects during at least 10 hr/week additional work in the lab as a responsibility associated with the assistantship.

Prerequisites: An accepted application through the process described below. Junior or Senior status. Course work and/or experience in at least one of the following areas:

biology/agriculture, economics/social science, coding/modeling, communication/videography.

Application process: Review of applications will begin August 19, 2022. 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 24, 2022. Information about the application process is available at <https://www.garrettlab.com/r2m-meta-tool-workshop-2022/>.

(Note that course registration in Fall 2022 should be complete by Aug 30 to avoid added fees, according to <https://catalog.ufl.edu/UGRD/dates-deadlines/2022-2023/#fall22text>)

Instructors

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Co-Instructors

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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 develop and publish tools for rapid disease risk assessment and mitigation planning for crop production systems at the national or regional level. These tools will help countries develop 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 are developing 'meta-tools' in the sense that national programs can use these meta-tools to create their own tools for evaluating risk and mitigation strategies.

As a team, students will develop tools as components of research for submission to peer-reviewed journals. Based on students' experience and interests, they may take the roles of biologists/agriculturalists, economists/social scientists, coders/modelers, and/or communicators/videographers in contributing to manuscripts. 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 researchers in the Garrett Lab.

The project will be developed in collaboration with scientists in the CGIAR (<https://www.cgiar.org/>), including work on improving seed systems (<https://tools4seedsystems.org/>) and with national agricultural programs, such as the Tanzania Agricultural Research Institute (TARI; <https://www.tari.go.tz/>). We will also test these rapid risk assessment tools in the US in collaboration with scientists in USDA APHIS (<https://www.aphis.usda.gov/aphis/home/>) working on protecting food production in Florida from new pathogens and insect pests. In the workshop we will analyze publicly available data and data collected by these groups.

We will be 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](#)]

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 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 17 August 2022 – 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 6905, Epidemiology and Data Science, during much of the semester (MWF Period 5 (11:45 am -12:35 pm US Eastern), **but has different assignments**. PLP 6905 will provide background in plant disease epidemiology that will be used in developing and publishing these tools.

Week of	Course meetings with PLP 6905	PLP 4932 workshop activities
Aug 22	Introduction to epidemiology, data science, and PLP 6905	Introduction to the workshop
Aug 29	Introduction to R programming environment; disease progress over time	Weekly update on concepts and plans
Sept 5	Disease progress over time; pathogen dispersal	Weekly update on concepts and plans
Sept 12	Pathogen dispersal; sampling	Weekly update on defining the project objectives precisely (after exploring a range of possibilities)
Sept 19	Epidemic networks	Weekly update on drafts of text, code, and videos
Sept 26	Lessons from COVID-19	Weekly update on drafts of text, code, and videos
Oct 3	Weather, climate, and disease risk	Weekly update on drafts of text, code, and videos
Oct 10	Ecoinformatics	Weekly update on drafts of text, code, and videos
Oct 17	Image analysis, socioeconomics, and decision support	**First complete draft of project materials presented, with feedback
Oct 24	Machine learning in epidemiology	Weekly update on progress in combining project components and potential issues
Oct 31	Digital agriculture and decision support	Weekly update on progress in combining project components and potential issues

Nov 7	The value of information and research priorities	Weekly update on project iterations incorporating review by team members
Nov 14	Continental epidemics and ecoinformatics	Weekly update on project iterations incorporating review by team members
Nov 21	Epidemics in seed systems	Weekly update on project iterations incorporating review by team members
Nov 28	Participant choice topic	Weekly update on project iterations incorporating review by team members
Dec 5	Review and synthesis of topics and frontiers	Weekly update on project iterations incorporating review by team members
Dec 12 Finals week		**Final version of project presented

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, coding/modeling, and communications/videography.

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 after the workshop is over.

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 code.

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.

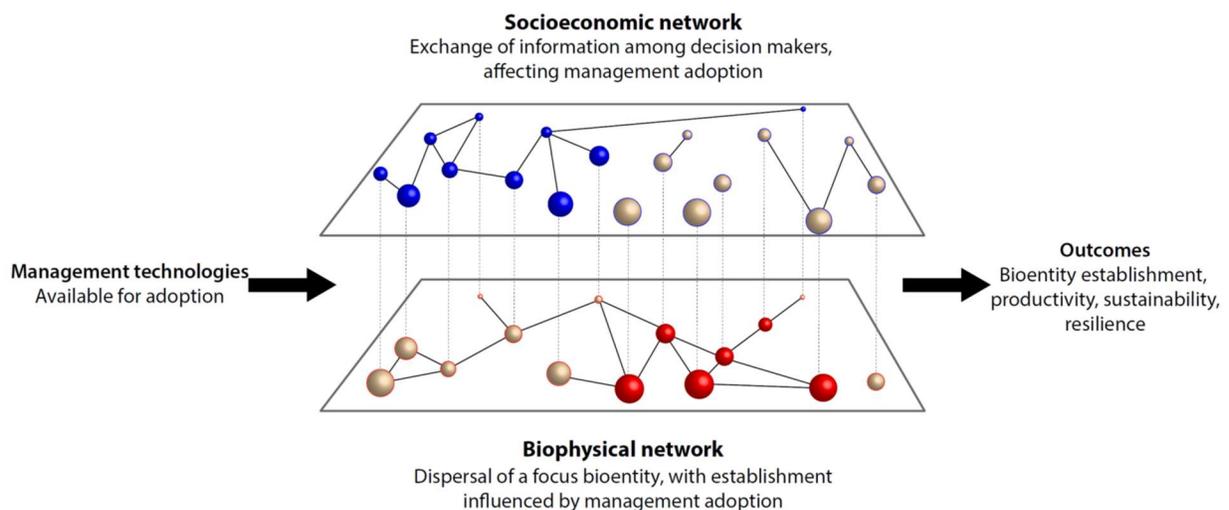
Grades and Grade Points: For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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.



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/ugrad/current/regulations/info/attendance.aspx>.

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 should first register with the Disability Resource Center at 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/ and provide appropriate documentation.

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.

On-line 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.

UF Policy: 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

The university’s counseling resources are available for students experiencing personal problems that interfere with their general well-being and/or academic performance. The Counseling & Wellness Center provides confidential counseling services at no cost for students that are currently enrolled with the university.

- 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
 - Career Resource Center, First Floor JWRU, 352-392-1601, www.crc.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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
- Online Course: <http://www.distance.ufl.edu/student-complaint-process>