

ZOO4926 Disease Ecology & Evolution (Fall 2020 – offered synchronously via Zoom)

Course Description

The focus of this course is to understand how ecological patterns and evolutionary processes shape host-pathogen interactions. Topics will include: pathogens in plants, animals, and humans; evolution of host defenses; disease-diversity relationships; microbiomes and dysbiosis; antibiotic resistance, herd immunity and vaccination; among others.

Pre-requisites and Co-requisites

No pre-requisites or co-requisites

Instructor

Ana V. Longo, PhD

Department of Biology

Office Location: 412 Carr Hall

Office Hours: Via Zoom Wednesday 10:30 am – 11:30 am, or by appointment.

Phone: 352.273.4982

Email: ana.longo@ufl.edu

Canvas mail should be used for all course-related communications. I will NOT answer emails from external accounts (e.g., GMAIL).

Course Meeting Times Period 3 and 4

Monday: 9:35 am – 11:30 am

Wednesday: 9:35 am – 10:25 am

Course Zoom Link

<https://ufl.zoom.us/j/96129613416?pwd=eTZlZFFwZmVrTmptYldnekNBSWtnUT09>

Meeting ID: 961 2961 3416

Passcode: DEE2020

Course Objectives

After successfully completing this course, students will be able to:

1. Compare and contrast major infectious diseases in plants, animals, and humans.
2. Understand how species can persist with pathogens/parasites.
3. Analyze case studies and identify the ecological and evolutionary factors promoting disease emergence.
4. Apply concepts from ecology and evolution to mitigate disease emergence or control spread of infectious diseases.
5. Communicate infectious disease information to broad audiences, including finding reliable sources of information.

Course Textbook (s) and/or Assigned Readings

This course does not have an assigned textbook. Reading material will be available on Canvas.

Grading

In class work and participation: 25 points

Learning Activities: 20 points each x 5 = 100 points

Quizzes: 10 points each x 10 = 100 points

Class Project: 100 points

Total: 325 points

Grading Scale

Total points will be rounded (for example: 94.4% = 94% = A-; 94.5 % = 95% = A).

Percent (out of 100)	Grade
≥95-100	A
≥90	A-
≥87	B+
≥85	B
≥80	B-
≥77	C+
≥75	C
≥70	C-
≥67	D+
≥65	D
≥60	D-
<60	E

Information on current UF grading policies for assigning grade points can be found in <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Class Attendance and Make-Up Policy

Class attendance is required. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Late assignments will not be accepted. A cumulative make-up quiz will be provided at the end of the semester for all quizzes missed. This score will replace one missing quiz grade or the lowest score. One extra assignment will be provided as well to replace one missing assignment. Assignment scores will not be replaced.

Online Privacy

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.**

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. [Click here for guidance on how to give feedback in a professional and respectful manner.](#) 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 ufl.bluera.com/ufl/. [Summaries of course evaluation results are available to students here.](#)

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) 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.

Class Demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones. Opinions held by other students should be respected in discussion.

University Honesty Policy

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 (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) 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.

Basic Needs, Counseling and Wellness Center

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact UF food pantry: <https://pantry.fieldandfork.ufl.edu> or the Dean of Students for support. 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 (<https://counseling.ufl.edu/>). Sexual Assault Recovery Services (SARS) available at Student Health Care Center 352-392-1161;

University Police Department: 392-1111 or 9-1-1 for emergencies.

Class Schedule

Week	Date	Class	Topic	Assignment/Quiz	Reading Material (confirm in Canvas if any changes)
1	Mon Aug 31	1	Welcome and Class Introduction		
	Wed Sept 2	2	Why Disease Ecology and Evolution?	Follow instructions on how to critically read a paper (Canvas).	Dobson, A. P., S. L. Pimm, L. Hannah, L. Kaufman, J. A. Ahumada, A. W. Ando, A. Bernstein, J. Busch, P. Daszak, J. Engelmann, M. F. Kinnaird, B. V. Li, T. Loch-Temzelides, T. Lovejoy, K. Nowak, P. R. Reichertz, and M. M. Vale. 2020. Ecology and economics for pandemic prevention. <i>Science</i> 369:379-381.
2	Mon Sept 7		HOLIDAY: NO CLASS: Labor Day		
	Wed Sept 9	3	Measuring Infection & Disease		Casadevall, A., and L. A. Pirofski. 2000. Host-pathogen interactions: basic concepts of microbial commensalism, colonization, infection, and disease. <i>Infection and Immunity</i> 68: 6511-6518.
3	Mon Sept 14	4	Learning activity: Analyzing susceptibility data in R	Install <i>RStudio</i> and <i>R</i> in your computer, return Figure/interpretation before next class (Sun Sept 20, 12:00pm, 20 points)	
	Wed Sept 16	5	Evolution of defense strategies I: Pre-infection		Hedrick, S. M. 2017. Understanding Immunity through the Lens of Disease Ecology. <i>Trends in Immunology</i> 38:888-903.
4	Mon Sept 21	6	Evolution of defense strategies II: Resistance and Tolerance	Quiz #1	Schneider, D. S., and J. S. Ayres. 2008. Two ways to survive infection: what resistance and tolerance can teach us about treating infectious diseases. <i>Nature Reviews Immunology</i> 8:889-895.
	Wed Sept 23	7	Trade-off theory		Alizon, S., A. Hurford, N. Mideo, and M. Van Baalen. 2009. Virulence evolution and the trade-off hypothesis: history, current state of affairs and the future. <i>Journal of Evolutionary Biology</i> 22:245-259.
5	Mon Sept 28	8	Red-Queen Dynamics	Quiz #2	Brockhurst, M. A., T. Chapman, K. C. King, J. E. Mank, S. Paterson, and G. D. Hurst. 2014. Running with the Red Queen: the role of biotic conflicts in evolution. <i>Proceedings of the Royal Society B: Biological Sciences</i> 281:20141382.
	Wed Sept 30	9	Learning activity: Red-Queen Dynamics Game	Return Figure/interpretation before next class (Sun Oct 4, 12:00pm, 20 points)	
6	Mon Oct 5	10	Evolution of Host Range	Quiz #3	TBD
	Wed Oct 7	11	Sequence and Timing of Infections		Karvonen, A., J. Jokela, and A.-L. Laine. 2019. Importance of Sequence and Timing in Parasite Coinfections. <i>Trends in Parasitology</i> 35:109-118.

Week	Date	Class	Topic	Assignment/Quiz	Reading Material (confirm in Canvas if any changes)
7	Mon Oct 12	12	Disease Superspreaders	Quiz #5 Instructions for Final projects	Martin, L. B., B. Addison, A. G. D. Bean, K. L. Buchanan, O. L. Crino, J. R. Eastwood, A. S. Flies et al. 2019. Extreme Competence: Keystone Hosts of Infections. Trends in Ecology & Evolution 34:303-314.
	Wed Oct 14	13	Learning activity: <i>Analyzing networks in R</i>	Return Figure/interpretation before next class (Sun Oct 18, 12:00pm, 20 points)	
8	Mon Oct 19	14	Parasite-parasite interactions in the wild	Quiz #6	Hellard, E., D. Fouchet, F. Vavre, and D. Pontier. 2015. Parasite-Parasite Interactions in the Wild: How To Detect Them? Trends in Parasitology 31:640-652.
	Wed Oct 21	15	Learning activity: <i>Analyzing interactions</i>	Return Figure/interpretation before next class (Sun Oct 25, 12:00pm, 20 points)	
9	Mon Oct 26	16	Introduction to Biological Invasions	Quiz #7	Halliday, F. W., and J. R. Rohr. 2019. Measuring the shape of the biodiversity-disease relationship across systems reveals new findings and key gaps. Nature Communications 10:5032.
	Wed Oct 28	17	Learning activity: <i>Analyzing diversity-disease data</i>	Return Figure/interpretation before next class (Sun Nov 1, 12:00pm, 20 points)	
10	Mon Nov 2	18	Seasonality and Disease Dynamics	Quiz #8	Altizer, S., A. Dobson, P. Hosseini, P. Hudson, M. Pascual, and P. Rohani. 2006. Seasonality and the dynamics of infectious diseases. Ecology Letters 9:467-484.
	Wed Nov 4	19	Learning activity: <i>Analyzing seasonal data</i>	Return Figure/interpretation before next class (Sun Nov 8, 12:00pm, 20 points)	
11	Mon Nov 9	20	Climate change and Wildlife Diseases	Quiz #9	Altizer, S., R. S. Ostfeld, P. T. J. Johnson, S. Kutz, and C. D. Harvell. 2013. Climate Change and Infectious Diseases: From Evidence to a Predictive Framework. Science 341:514-519.
	Wed Nov 11		HOLIDAY: NO CLASS: Veterans		
12	Mon Nov 16	21	Landscape genetics and disease risk	Quiz #10	Archie, E. A., G. Luikart, and V. O. Ezenwa. 2009. Infecting epidemiology with genetics: a new frontier in disease ecology. Trends in Ecology & Evolution 24:21-30.
	Wed Nov 18	22	Parasites in Hybrid Zones		Theodosopoulos, A. N., A. K. Hund, and S. A. Taylor. 2019. Parasites and Host Species Barriers in Animal Hybrid Zones. Trends in Ecology & Evolution 34:19-30.
13	Mon Nov 23	23	Outreach & Social Media Activity: <i>Communicating disease ecology</i>	Quiz #11 (bonus)	
	Wed Nov 25		THANKSGIVING BREAK		
14	Mon Nov 30	24	Project presentations (10-15min per student)		

Week	Date	Class	Topic	Assignment/Quiz	Reading Material (confirm in Canvas if any changes)
	Wed Dec 2	25	Project presentations (10-15min per student)		
15	Mon Dec 7	26	Project presentations (10-15min per student)		
	Wed Dec 9	27	Project presentations (10-15min per student)		