BIOL 50.02: ECOLOGY OF INFECTIOUS DISEASE (EID)
Draft syllabus for initial offering in Spring 2022 created in March 2021
Subject to change for S22, but this is the right flavor

COURSE OVERVIEW

The primary goal of this course is to apply the tools, concepts and approaches of ecological science to the vexing problem of infectious disease. We will begin with careful reading of published case studies to develop both content mastery and strategies for identifying important areas for further work. We will also meet with campus librarians and read materials about leading productive discussions, writing effective research proposals, and providing constructive peer reviews. Students will then develop a collaborative research proposal to better understand the ecological aspect of a particular disease or type of disease, practice the art of constructive peer review with one another's proposals, and iteratively improve their own proposals. We will finish the term by running a mock grant review panel with the final proposals produced by members of the class. Throughout, we will work together to build communication skills as well as cultivate key academic virtues.

By the end of the term, students will:

1. Be more proficient in finding, reading, interpreting, and synthesizing the relevant peer-reviewed literature in general, and for studies of the ecology of infectious disease in particular
2. Be more skilled at asking interesting and answerable research questions, developing testable hypotheses, and crafting effective strategies to address those research questions
3. Be better scientific writers and peer reviewers
4. Understand key aspects of the grant review process
5. Have cultivated key traits such as persistence, teamwork, self-confidence, and time management

Preparation: A solid background in ecology is expected, including BIOL 16 plus at least one intermediate level course from among the following: BIOL 21- BIOL 31, BIOL 46, or BIOL 48.

Students should also have some experience reading and interpreting the primary literature in ecology.

INSTRUCTOR & CONTACT INFO

Kathryn L. Cottingham, Ph.D.

The three main ways to contact me are:

Scheduled student hours: *[~2 hours per week to be determined before this syllabus is finalized for teaching*]

Slack: @KathyCottingham

Our class Slack channel (linked out from Canvas) will be the primary mechanism for both near-real-time communication and asking open questions of the teaching staff and one another. I will try to keep an eye on Slack between meetings from ~10 am through at least 6 pm each weekday, and at least once per day on the weekends.

If you've never used Slack, this Knowledge Base article is a good place to get started.

Email: Kathryn.L.Cottingham@dartmouth.edu

If you have a personal inquiry, please use a private Slack DM or an email. I will respond to all Bio 50.02-related emails received by 6:00 pm before I sign off for the evening.

RESPONSIBILITIES & EXPECTATIONS

I expect that students in this course will

1. Attend course meetings promptly and give them full attention
2. Communicate with the professor in advance or as soon as possible thereafter regarding attendance, timely completion of assignments, technical glitches, and access issues
3. Keep track of course activities and announcements via our Canvas site; ask if there are questions and draw the teaching staff's attention to problems when you run into them
4. Come to the course meetings having done the requested preparatory work by the stated time
5. Actively participate at course meetings by contributing to group deliberations and analyses, asking and answering questions, and leading lively discussions when it is your turn
6. Contribute to a positive learning environment for all students – be respectful in whole-class and group settings, be constructive in peer reviews, and answer others' questions on Slack and in the Google documents
7. Demonstrate understanding of course material in the various written assignments
8. Seek help from the professor through questions at class, student hours, appointments, Slack and/or email

Students can expect Prof. Cottingham to

1. Be organized and well-prepared throughout the course
2. Be knowledgeable about the course material
3. Be flexible given the pandemic
4. Stimulate interest in the course material
5. Explain course material clearly and efficiently
6. Answer student questions thoroughly
7. Be available for consultations regarding course material, assignments, and other student concerns
8. Use methods of evaluation that provide a representative test of student knowledge and understanding of the course material
9. Grade student work fairly and return it promptly
10. Be receptive to student requests for accommodations and suggestions for improvement

COURSE MEETINGS

We will meet during both our regularly scheduled MWF course time as well as most of the x-hours.

To the extent possible, your on-time attendance and active participation are expected at all course meetings. If illness or scheduling conflicts preclude participation, please let Professor Cottingham know as soon as possible so that we can make accommodations that maximize your ability to participate asynchronously.

COURSE REQUIREMENTS

As part of this course, you will be asked to (1) demonstrate your understanding of the concepts, principles, and approaches of ecology as applied to the general question of infectious disease; (2) read, discuss, and synthesize the peer-reviewed literature; (3) write a coherent and exciting research proposal, then improve upon it in response to peer review; (4) provide constructive peer review to others; and (5) contribute to a positive course environment for all students.

Progress towards these goals will be assessed using the following assignments:

(1) Discussions of the primary research literature (30%)
(2) Group research proposal (40%)
(3) Individual written peer reviews of existing proposals and your classmates' proposals (20%)
(4) Individual contribution to a positive course environment (10%)

The point values and relative weighting of these different criteria are outlined in the table below.

Requirement	**Possible Score**
Discussions	120 pts
• Evidence of preparation via study guides (individual grade)	40
• Contributions to discussions throughout term (individual grade)	60
• Preparation to lead discussion (group grade)	10
• Quality of discussion when you lead (group grade)	10
Research Proposal (group grades)	160 pts
• Early-term team-building milestones	15
• Annotated bibliography (due 1 week before leading discussion)	15
• First draft (due 1.5 days before class discusses it)	30
• Updated draft (due 1.5 days before your panel session)	100
Written Peer Reviews (individual grades)	80 pts
• Reviews of the cholera and Lyme disease proposals	10
• Reviews for initial proposals by other groups (drop lowest score)	40
• Review submissions for the end-of-term mock grant panel	30
Contribution to a positive course environment (individual grades)	40 pts
• Attendance, timeliness, engagement	
• Participation in course activities, both in style and in substance	
• Contributions to the research proposal	
Total Possible Score	**400**

Your final grade will be based on the total number of points earned relative to other students in the class. Grade distributions will be comparable to those in other advanced-level biology courses.

Below, I provide initial information about the various course requirements. Further details about leading discussions, the research proposal, and writing peer reviews will be made available in Canvas as we go through the quarter; the goal here is to give you an idea about what we're expecting without overwhelming you with too much detail.

<u>Discussions</u>

Every useful discussion has goals. The goals of our discussion sessions are to (1) develop an understanding of the issues and viewpoints represented in the readings, (2) practice the critical review of scientific research, and (3) practice expressing views and questions about the ecology of infectious disease. Here, you will be evaluated on (a) how well you prepare for and (b) contribute to discussions led by others, as well as (c) how well you lead discussion when it's your turn.

- A packet with suggestions on how to be an effective Discussion Leader will be distributed via Canvas at the end of the first week of the term.

- **To assess your preparation for the initial literature discussions**, there will be study guides for each scheduled literature discussion during the first ~4 weeks of the term. These will be submitted prior to class and evaluated on a 10-point scale for the depth of answers and the quality of thought that went into them. You do not need to write beautiful prose or even complete sentences -- bulleted comments to show you've thought about and answered the questions are sufficient. Things we'll be looking for include: Is it clear that you read and understood the assigned papers, and thought carefully about their content? If you didn't understand something, did you write it down so you could ask at class? Did you integrate material from other readings or class discussion into your answers? There will be ~5 study guides during this period, each graded on a 10-point scale; your four highest scores will be summed for this component.

- **When you are Discussion Leader, you and your team are responsible for making sure we meet our goals by completing three tasks**:

  1. ***Choosing 1-2 papers for your focal disease based on your background reading, in consultation with the professor***. You'll see over the first part of the term what kinds of papers work well for class discussion and which do not, so as you are putting together the annotated bibliography for your proposal, keep an eye out for good discussion papers.
  2. ***Preparing a brief introductory lecture of not more than 10 minutes to introduce your topic and the paper(s) being evaluated.*** We'll provide you with examples of how to do this in our initial, faculty-led case studies.
  3. ***Develop a "lesson plan" to structure the in-class discussion***. This "lesson plan" will consist of (a) the brief introductory lecture, (b) a list of questions you plan to ask during the discussion and (c) a brief statement of the summary points you expect to make at the end of the discussion. Your questions should provoke discussion and prepare the rest of the class with some of the introductory material they'll need to constructively evaluate your proposal.

  Immediately prior to your discussion, please turn in the following via Canvas:
  - The slides and any lecture notes for your group's introductory lecture
  - Your group's lesson plan

You are strongly encouraged to consult with Prof. Cottingham in advance of your discussion, either during office hours or by making a separate appointment.

Research Proposal

Detailed instructions for the research proposal will be provided during weeks 2 and 3 of the term, but the general idea is that groups of three students will work together to develop a short-format grant proposal that identifies a problem of significance in the field of infectious disease ecology, then proposes a study or set of studies that will make significant progress toward solving the problem. Groups will be assembled around areas of common interest, and group codes (A-F in the course schedule, below) will be assigned at random to determine when each's group's deadlines will be.

To prepare for this process, we will read chapters from the Dartmouth-developed book *Writing Successful Science Proposals,* 3rd edition, by Andy Friedland, Carol Folt, and Jen Mercer. The assigned chapters will be available in Canvas, but if you anticipate going on to graduate school, you may want to purchase the book so you have your own copy moving forwards ($22).

For the purposes of this assignment, we will follow the budget constraints of a small grant for the Division of Environmental Biology at NSF. This means that you are limited to a two-year time frame and an approximate budget of $200,000, though you do not have to provide a budget or budget justification. Focus on something novel and important, but reasonable for this budget and time frame.

Your proposal should begin with a one-page Project Summary that provides a succinct introduction and clear statement of the research question or hypothesis, why it is important, and how you will solve or test it. Then, write a Project Description that is 6-8 pages (single-spaced) with the following sections: (1) Overview & Objectives: briefly cover any necessary background and present your study system and research objective(s). (2) Approach: describe your study design, the data that you will collect, and how they will meet your objectives and thereby solve your problem or test your hypothesis. (3) Timeline: map the data collection and analysis onto a 24-month period. Any figures or tables need to fit within the 6-8 page limit; the References/Works Cited will follow the proposal and do not count against the page limit.

Written Peer Reviews

During the term, you will provide constructive peer reviews on two proposals written by senior researchers as well as the initial and final proposals written by each of the other research groups. Before you write your first review, we will do a series of readings about what makes a good review, then compile a class template for reviews that we'll update just prior to each new stage of the quarter.

Contributions to a Positive Course Environment

We all need to work together to make this class a positive place for learning. Everyone should behave professionally, treat others with courtesy and respect, and refrain from using profanity or socially offensive language. As the term gets going, we will discuss class norms for how to behave in the classroom, use the Slack channels and contribute to shared Google documents; if needed, we can revisit those norms during the term. Detailed instructions on self-evaluation for this component will be provided towards the end of the term.

GETTING HELP FINDING REFERENCES

Multiple assignments in this course require identifying appropriate references from the peer-reviewed ecological literature. As such, **mandatory training sessions on electronic reference searches and managing your reference collection will be held during the first two X-periods.**

Once the term gets underway and you start working on your projects, please contact Prof. Cottingham, Paige Scudder at Dana Biomedical Library, or any Dana reference librarian for assistance. We're here to help and are happy to do it!

TENTATIVE COURSE SCHEDULE

Note for review: I'm current envisioning an in-person course in the 11, 12, or 2 block, with the final selection to depend on other Bio and allied STEM courses offered that term. X-hours are not strongly sequenced with the MWF material, so whether they fall on a Tuesday or a Thursday won't matter.

Week	Day	Topic	Reading(s)	Written Assignment
1	M	Orientation & organization Why study EID? How to read a scientific paper	Syllabus Choose 2-3 of the following reading guides and come prepared to share the take-home messages with the class: Rubin (2016) Pain (2016) Keshav's "How to read a paper" Rodriguez (2015)	
	W	Intro to EID: key theories & concepts Paper discussion	Each student will be assigned 2 classic papers, to be chosen from among examples such as: Daszak et al. (2000) Harvell et al. (2002) Lafferty (2009) Altizer et al. (2013)	Study guide
		X-hour: Library Skills 1 - Web of Science and other tools that are not Google Scholar, then explore potential case studies		Find 5 papers on your potential case study
	F	Debrief library skills Initial conversation about student-led case studies How to lead a discussion	KLC Discussion guide	
2	M	Biodiversity dilutes disease	Ostfeld & Keesing (2012) Civitello et al. (2015) Allan et al. (2009)	Study guide

Week	Day	Topic	Reading(s)	Written Assignment
	W	Biodiversity does not dilute disease	Salkeld et al. (2013) Salkeld et al. (2015) Civitello et al. (2015)	Study guide
		X-hour: Library Skills 2 - reference management software		Get your 5 papers into the software
	F	How to write a scientific proposal Discussion: Ideas for proposals about biodiversity & dilution	Each student will read selected chapters of Friedland et al. (2018)	Proposal idea
3	M	Case Study 1: Cholera	Colwell (1996) Huq et al. (2003) Meszaros et al. (2012) Wucher et al. (2019)	Study guide
	W	How to review a scientific proposal Discussion: Ideas for proposals about the ecology of cholera	Review guidelines	
		X-hour: Assemble case-study groups; develop template for peer review		
	F	Cholera, continued Practice written proposal review	Chiavelli, Cottingham et al. EID proposal "How to criticize with kindness"	Written review
4	M	Case Study 2: Lyme Disease How to review a scientific proposal II	Eisen et al. (2012) Kilpatrick et al. (2017) More review guidelines	Study guide

Week	Day	Topic	Reading(s)	Written Assignment
	W	Lyme disease papers, continued Discussion: Ideas for proposals about the ecology of Lyme disease	Diuk-Wasser et al. (2020) Salomon et al. (2021)	
		X-hour: Iterate on peer-review template; time for groups to work together		
	F	Lyme disease, continued Practice written proposal review	Lyme disease proposal, will be asking colleagues for examples	Written review
5	M	Student-led case study A: background papers	2-3 student-chosen papers	Group A turns in proposal by 11:59 pm
	W	Initial review of the students' proposal	Proposal for group A	Reviews from other groups due by 9 am
		X-hour: Did well/do better – lessons for upcoming groups		
	F	Student-led case study B: background papers	2-3 student-chosen papers	Group B turns in proposal by 11:59 pm
6	M	Initial review of the students' proposal	Proposal for group B	Reviews from other groups due by 9 am
	W	Student-led case study C: background papers	2-3 student-chosen papers	Group C turns in proposal by 11:59 pm
		X-hour: Time for groups to work together/get feedback		
	F	Initial review of the students' proposal	Proposal for group C	Reviews from other groups due by 9 am
7	M	Student-led case study D: background papers	2-3 student-chosen papers	Group D turns in proposal by 11:59 pm
	W	Initial review of the students' proposal	Proposal for group D	Reviews from other groups due by 9 am

Week	Day	Topic	Reading(s)	Written Assignment
		X-hour: Time for groups to work together/get feedback		
	F	Student-led case study E: background papers	2-3 student-chosen papers	Group E turns in proposal by 11:59 pm
8	M	Initial review of the students' proposal	Proposal for group E	Reviews from other groups due by 9 am
	W	Student-led case study F: background papers	2-3 student-chosen papers	Group F turns in proposal by 11:59 pm
		X-hour: Mock panel preparation		
	F	Initial review of the students' proposal	Proposal for group F	Reviews from other groups due by 9 am Groups A, B final proposals due Saturday at 11:59 pm
9	M	Mock Panel session 1: Revisit student proposals for case studies A & B	Proposals for groups A and B	Reviews due by 9 am Groups C, D final proposals due at 11:59 pm
	W	Mock Panel session 2: Revisit student proposals for case studies C & D	Proposals for groups C and D	Reviews due by 9 am Groups E, F final proposals due at 11:59 pm
	F	Mock Panel session 3: Revisit student proposals for case studies E & F	Proposals for groups E and F	Reviews due by 9 am
10	W	Synthesis & Wrap-Up		

STUDENT NEEDS
[placeholder text to be replaced by the current version when the syllabus is finalized]

Student Accessibility and Accommodations
I am happy to make adjustments to the course to accommodate disabilities. Send me a private Slack message or an email to schedule a meeting as early in the term as possible so that we can work together to identify what changes might be needed to meet your needs, within the context of the current course structure and supports. All inquiries and discussions will be kept confidential within the teaching staff.

Some accommodations may require students to consult with Student Accessibility Services (SAS; see the Getting Started with SAS webpage) and request that an accommodation email be sent to me. If students have questions about whether they are eligible for accommodations, they should contact the SAS office.

Textbook Costs, Printing, and Financial Difficulty
If you encounter financial challenges related to this class, please let me know. We have some resources to help.

Religious Observances
Some students may wish to take part in religious observances that occur during the term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

Mental Health & Wellness
The academic environment at Dartmouth is challenging, our terms are intensive, and classes are not the only demanding part of your life (especially if you are not living on campus right now). I also recognize that the pandemic and virtual environment may only compound these background issues. Resources available to you to support your wellness, include your undergraduate dean (http://www.dartmouth.edu/~upperde/), Counseling and Human Development (http://www.dartmouth.edu/~chd/), and the Student Wellness Center (http://www.dartmouth.edu/~healthed/).

I encourage you to use these resources to take care of yourself throughout the term, and to speak to me if you experience any difficulties. Adjustments to the schedule are possible!

Title IX
At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all have equal access to the educational and employment opportunities Dartmouth offers. We strive to promote an environment of sexual respect, safety, and well-being. In its policies and standards, Dartmouth demonstrates unequivocally that sexual assault, gender-based harassment, domestic violence, dating violence, and stalking are not tolerated in our community.

The Sexual Respect Website (https://sexual-respect.dartmouth.edu) at Dartmouth provides a wealth of information on your rights with regard to sexual respect and resources that are available to all in our community.

Please note that, as a faculty member, I am obligated to share disclosures regarding conduct under Title IX with Dartmouth's Title IX Coordinator. Confidential resources are also available, and

include licensed medical or counseling professionals (e.g., a licensed psychologist), staff members of organizations recognized as rape crisis centers under state law (such as WISE), and ordained clergy (see https://dartgo.org/titleix_resources).

Should you have any questions, please feel free to contact Dartmouth's Title IX Coordinator or the Deputy Title IX Coordinator for the Guarini School. Their contact information can be found on the sexual respect website at: https://sexual-respect.dartmouth.edu

HONOR PRINCIPLE

Honesty is the foundation of the academic pursuit of knowledge. In recognition of this, the faculty will not overlook any violations of the Academic Honor Principle. Indeed, the Faculty Handbook of Dartmouth College states explicitly that I am obligated to report potential violations of the Academic Honor Principle to the Dartmouth College Committee on Standards.

The Dartmouth Honor Principle applies to all work you submit for a grade in this course. All work you do for assignments designated as work to be done by an individual must be your own, as informed by the materials available to all students. Assignments turned in by groups of students working together should represent the work of that team, as guided by the teaching staff.

As noted above, all assignments are open book to the extent that any information available to the whole class – via the textbook, Canvas, or the Web – may be accessed. However, you may not access private materials not available to everyone and you may not talk to anyone about the individual assignments except Professor Cottingham.

Any questions? Contact Prof. Cottingham via email or in person.