

Draft Syllabus

26:375:550 Symbiosis and host-associated microbiomes

This class will meet once per week, for three hours. Most classes will be divided into three 50 minute sessions that will vary between activities such as lectures, paper discussions, presentations, and guest lectures.

This course is open to graduate students, as well as undergrads that have achieved a minimum letter grade of 'B' in General Microbiology 21:120:335.

The aim of this course is to provide students with a thorough understanding of the contemporary and classical research in symbiosis and host-associated microbiomes. This course is designed to create a synthesis of concepts across fields. Symbiotic relationships have been studied in silos of ecology, evolution, microbiology, systems biology, human health, and plant biology, to name a few, and it is rare for scientists to consider research beyond their specific field. Because of this, unifying patterns across systems are often overlooked. In this course we will take a deep dive into host-microbiome and symbiotic relationships while taking a holistic approach to identify emerging patterns across fields.

Learning objectives

By the end of this course, students will be able to:

- Describe symbiosis and host-microbial relationships and examples of how they manifest in the natural world
- Describe patterns that emerge in symbiosis and host-microbial relationships across fields
- Describe how symbiosis and host-microbial relationships are important to human health, evolution, ecology, and ecosystem functioning
- Write a review article on a topic of their choice
- Critically examine scientific literature and discuss it with a group
- Know how to give an oral presentation on a topic with which they have a deep understanding

Assignments

Present a paper

Each student will present a primary research paper on symbiosis or host-microbiome relationships. All students in the class will be required to read this paper, but the leading student(s) will facilitate discussion on the topic.

Graduate students will present papers as individuals, while undergraduate students will do so in pairs.

Present a case study

Each student will give a 30 minute presentation on a particular symbiotic relationship. This will require a review of literature and the creation of a powerpoint presentation. Undergraduate students will do this in pairs, and graduate students will do this as individuals.

Case study review paper

Students will write a review paper on the system that they choose for their case study. The review paper should be between 2500-3000 words. The grade for the review paper will be given based on subcategories. Of the total 30%, 5% will be from a paper outline, another 5% will be from an annotated bibliography, and 20% will be from the final paper.

Exam

Undergraduate students only will have the option to complete one exam to test their knowledge of concepts in symbiosis and host-microbiome relationships instead of writing a case study review paper.

A note on undergrad pairs

If both undergraduate students that presented a case study decide to write the research paper, the word count will be the same as for the graduate students, and they can write together. If only one student from the pair chooses to write the review paper, the paper should be between 1800-2000 words.

The pair groups for the case study and for the paper discussion should be different (don't pair with the same person twice).

Grading

Present a paper 25%

Present a case study 25%

Case study paper or exam 30%

Participation in discussion 20%

Course schedule

Class	Topics
1	- Class organization - Students sign up for paper discussion and case study presentation dates. - Lecture: Intro to symbiosis, definitions and overview of themes for the course
2	- Lecture: From mutualism to parasitism - Case study 1 – Dr. Khadempour will present a case study - Paper discussion 1 – Dr. Khadempour will lead a paper discussion
3	- Lecture: From obligate to facultative - Case study 2 - Paper discussion 2
4	- Lecture: From vertically transmitted to environmentally acquired - Case study 3 - Paper discussion 3
5	- Lecture: Non-microbial mutualisms - Case study 4 - Paper discussion 4
6	- Lecture: Non-microbial parasitism - Case study 5 - Paper discussion 5
7	- Lecture: Symbiosis and human health - Case study 6 - Paper discussion 6
8	- Lecture: Symbiosis and climate change - Case study 7 - Paper discussion 7
9	- Lecture: Non-microbial parasitism - Case study 8 - Paper discussion 8
10	- Lecture: Co-evolution and co-diversification - Case study 9 - Paper discussion 9
11	- Lecture: Red queen hypothesis - Case study 10 - Paper discussion 10
12	- Lecture: Are organelles symbionts? - Case study 11 - Paper discussion 11
13	- Lecture: Past, present and future of methods in studying symbiosis and host-microbiome systems - Case study 12 - Paper discussion 12
14	- Case study 13 - Paper discussion 13 - Lecture: Crossing boundaries in symbiosis fields

*For class 2, Dr. Khadempour will be leading both the case study and paper discussion as an example, and will discuss the requirements for the students. From week 3 onward, students will sign up to lead these activities. Students should not sign up for both activities in the same week.