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BIOM 491.01: ST - Host-Microbe Interactions

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BIOM 491-01: Host-Microbe Interactions

Instructor: Dr. Brandon S. Cooper
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Students with disabilities -The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you have a disability that adversely affects your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Introduction -Many organisms on the planet are hosts that interact with a diversity of microbes. These host-associated microbes range from pathogens to mutualists that reduce and increase host fitness, respectively. Understanding these interactions is crucial to explain patterns of biodiversity and to improve the quality of human life. This course will explore the diversity of host-microbe interactions in nature using the primary literature as our guide. Students will participate in, and lead, group discussions on focal topics. Throughout the semester, students will work with their peers and with the professor to write a focused mini-review. Together, activities in this course will improve the student's ability to communicate in a variety of ways, while diving deeply into the most recent and relevant scientific literature on host-microbe interactions.

Learning Outcomes -Following this course, it is expected that the student can understand and apply general concepts in host-microbe interactions, with focus on: 1) acquisition and transmission of host-associated microbes, 2) host specificity and immunity, 3) host-pathogen interactions, 4) gut microbiome, 5) holobiont and host-microbe (co)evolution, 6) symbiosis, and 7) applications of host-microbe interactions. Students will learn how: to read and interpret scientific information; to lead group discussions of primary scientific articles; to comprehensively review a focused topic in written form; to provide constructive peer review to colleagues; and to give public presentations on a focused topic. Thus, it is expected that students will learn how to generally obtain, synthesize, and communicate technical information to their peers.

Things to consider -Students should have basic knowledge of molecular/cell biology, genetics, physiology, and evolutionary biology. You need not be an expert in these areas, but you should expect to put some time into refreshing your memory if you do not have a basic grasp of key concepts from these areas. Don't worry! A goal of this course is to teach you *how* to acquire and synthesize information. Students are encouraged to work together and to leverage any and all publicly available information to help them complete class assignments and achieve their goals.

Grading -I want you to learn as much as possible using primary research articles as our guide. Thus, this class has NO EXAMS. Instead, you will be graded on: 1) participation in class discussions, including one you lead, 2) a presentation on a research paper, and 3) a minireview on a topic of your choice. For the latter, you will write one paper that you will improve through a process of peer review and review by me as an editor. This process mimics what researchers go through when we submit articles for publication.

CLASS PARTICIPATION: 30%

Students will be graded on leading one paper discussion and on daily participation. For most class periods, students must submit a completed ***discussion worksheet*** via Moodle, prior to the start of class. Students are expected to ask two questions during each discussion period. ***Students will also lead the discussion of one paper during the semester.*** When leading discussion, students are expected to produce a ***one-page handout*** that summarizes the paper that they will upload to Moodle 24 hours prior to the start of class. PLEASE REMEMBER that we are all here to learn together, and the more questions you ask the more we can all learn, including me. If you come prepared, this class will be fun. Put the work in to get the most out of this course—I promise it is worth it.

PRESENTATIONS: 30%

Each student will present one lecture. Students will sign up to review a topic and to present a primary scientific paper to the class. Each ***presentation*** will be approximately 20 minutes long, and the presenter will then use the remainder of the period to lead discussion on the focal topic(s). Speakers will prepare ***handouts*** for the class to use during the discussion portion of the presentation. These must be uploaded to the daily Moodle section 24 hours prior to the start of class.

During the first few class periods, students will have the opportunity to choose a paper from a list that I provide. Don't worry if the topics seem complex—a key goal of this class is to learn how to distill such complexity into something useful. Importantly, students must complete a literature review to introduce the topic to the class and to summarize the state of the field, with a minimum of five cited papers in their presentation. I will start us off by giving the first presentation myself. This will enable students to see what is expected. Tips for giving a good presentation are provided in a separate document.

Grading: Your grade will be based on the quality of the presentation and discussion, using an evaluation form as a rubric. The student audience and I will provide feedback for each presenter using the same form. I will meet with each student after the presentation to give feedback and assign the grade. I will also provide a summary of the peer reviews. Peers must submit the presentation feedback form via Moodle within 24 hours of the end of each presentation.

MINIREVIEWS: 40% (GRADUATE STUDENTS SEE BELOW)

The grade will be based on the average of ***two written mini-reviews (same topic, multiple drafts)*** over the course of the semester. The first review will be due mid-semester. I will then provide comments/edits to this document, and you will have the rest of the semester to improve this document (i.e., your second mini-review will be an updated/edited version of the first). A key part of communicating is giving and receiving criticism. Thus, each student will be randomly paired with a partner, and each of you will provide the other with peer review on the first draft prior to turning the assignment in to me mid-semester. This will enable you to help each other, while learning how to criticize, and take criticism, effectively.

Mini-reviews must be a maximum of 3 single-spaced pages (11 pt., Arial font, and 1-inch margins). This limit does NOT including references, for which there is no limit—a minimum of 8 references are required, although the best reviews will have more. While there is no exact format, please include a title and your name. We will discuss specifics in class.

Guidelines

1) The review topic(s) must be on a topic that falls broadly within host-microbe interactions. It will be impossible for you to cover an entire area (e.g., "host-microbe coevolution"); thus, multiple students may review portions of the same broader section. However, I do not want a lot of topic overlap so those that choose topics early will have more options than those that choose topics late. Your review should provide adequate background, but it should not simply be a summary. Students should strive to provide background, context, and summary, in combination with synthesis of ideas to say something novel. Some things to consider: Why is this research area interesting? What were the important discoveries that started the field? What are the most important questions in the field right now, how are they being addressed, and what are the implications?

2) Be a critic! What are the recent and significant findings in the field? Is there disagreement among scientists within the field that are important to think about? After reading the literature what do YOU think? Take a stand. As you can see, the expectation is that you will use information from many papers, authors, sources to write your review. So resist finding an already published review to use as a roadmap, and instead go to the primary literature. Finally, at the end of your review summarize what you see as the most important way forward.

Grading:

Organization and clarity:
1. Is there a clear flow and organization to the text?
2. Are there transitions from one thought to another?

Content and information:
1. Do you provide sufficient background and summary statements to give the reader the big picture?
2. Do you provide basic experimental details to support the statements you make?
3. Do you integrate the facts into a cohesive overview, and if possible have you connected findings to relevant concepts/theory? For example, what does theory predict, have those predictions been tested, and what were the findings?

Accuracy:
1. Are all your stated facts correct?
2. Have you cited the appropriate references?
3. Have you correctly interpreted experimental results?

Creativity:
1. Have you commented on the significance of the findings you present?
2. Did you draw from sources of information (including your own imagination) other than those I have provided?

Other stuff

Graduate students must write a two-page grant proposal that they will turn in at the end of the semester. This proposal should be single spaced, and it cannot overlap with topics the student covered as part of other assignments. Because I want this to be useful, graduate students may write a proposal on any topic they like— I expect that most graduate students will write this on their own research, and it need not be specific to host-microbe interactions. Learning how to write in a compelling way, in limited space, is a key skill. You will be graded as if you have submitted a real proposal with grades including: Exceptional (fund at high priority), Exceptional (fund at medium priority), Very good (fund at low priority), Good (do not fund), Fair (do not fund), and Poor (do not fund). You can think of these as: A+, A, B, C, D, and F; and your grade will be considered along with your minireview in the 40% writing portion of your grade (20% minireview and 20% research proposal). Importantly, I will take the time to give comments and edits that will help improve your proposal into something useful for you downstream.

Academic misconduct will be reported and handled as described in the University of Montana Student Conduct Code. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code: http://www.umt.edu/vpsa/policies/student_conduct.php. If I see any evidence of plagiarism students may receive a failing grade for the entire course, and I will file a report with the Provost & Vice President for Academic Affairs. Remember, you have an interesting and unique view, even when you are not yet an expert. So do not assume someone else knows better by plagiarizing their thoughts and ideas— use your own.

Dropping this course or changing grading status will strictly follow the University policies and procedures, which are described in the catalog. Please note that dropping the course or changing the grading status (to CR/NCR) is not automatically approved after the 30th day of the semester. These may be requested by petition, but the petition must be accompanied by documentation of extenuating circumstances. Requests to drop the course or change the grading status simply to benefit a student's grade point average will not be approved.