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BIOM 420.01: Host-Microbe Interactions

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BIOM 420: Host-Microbe Interactions

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What I do: <http://www.cooper-lab.org/research.html>

Land Acknowledgment - The University of Montana acknowledges that we are in the aboriginal territories of the Salish and Kalispel people. We honor the path they have always shown us in caring for this place for the generations to come. The class is held in the Payne Family Native American Center, which is the first facility of its type in the nation. I thank the Department of Native American Studies and the American Indian Student Services for allowing us to use this space.

Accessibility, disabilities, and special accommodations:

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, ode@umontana.edu , or visit www.umt.edu/disability for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish. Any questions please contact me.

Cultural and Ceremonial Leave Policy - Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student's customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student's attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor.

Food insecurity - Any student who faces challenges securing food or housing, and believes that this could affect their performance in this course, is urged to contact any or all of the following campuses resources: Food Pantry Program (umpantry@mso.umt.edu), ASUM Renter Center (<https://medium.com/griz-renter-blog>), and TRiO Student Support Services (www.umt.edu/triosss/apply.php). Please also feel comfortable approaching me. I understand the challenges you face and want to help.

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—both preprints and peer-reviewed articles comprise “primary literature”. 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.

Conceptual 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 literature; 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.

Writing Learning Outcomes –

- Identify and pursue more sophisticated questions for academic inquiry
- Find, evaluate, analyze, and synthesize information effectively from diverse sources
- Manage multiple perspectives as appropriate
- Recognize the purposes and needs of discipline-specific audiences and adopt the academic voice necessary for the chosen discipline
- Use multiple drafts, revision, and editing in conducting inquiry and preparing written work
- Follow the conventions of citation, documentation, and formal presentation appropriate to that discipline
- Develop competence in information technology and digital literacy

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 the primary literature. Thus, **this class has NO EXAMS. Instead, you will be graded on: 1) class participation, 2) presentations, and 3) written assignments that includes a mini-review 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. Students will also be graded on a separate short review of one article – from the primary literature.

CLASS PARTICIPATION: 10%

Students will be graded on daily participation. For most class periods, students must submit a completed **discussion worksheet** via Moodle, prior to the start of class. These worksheets help prepare students for in-class discussions. Students are expected to participate in a meaningful way during each class period. PLEASE REMEMBER that we are all here to learn together, and the more questions you ask the more we can all learn, including me.

PRESENTATIONS: 15%

Each student will present at least one lecture. Students will sign up to review a topic and to present a scientific paper from the primary literature to the class. Each **presentation** will last an entire class period, but that includes a lot of time dedicated to questions and discussion. Typical presentations are of a length that would take approximately 20-30 minutes to give uninterrupted. Speakers will prepare a **two-page summary handout** for the class to use during the discussion portion of the presentation—this handout contributes to the writing portion of your grade (see below). 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 10 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.

Grading:

WRITING: 75% (GRADUATE STUDENTS SEE BELOW)

The writing portion will be based the average of **TWO written mini-reviews (same topic, multiple drafts; 8 pages each)** over the course of the semester (60%) plus an abstract for the mini-review that you will write early in the course (15%) (1 page, 1.5 line spacing, 11 pt., Arial font, and 1-inch margins). **1)** We will first all work together to develop outlines that will be informally graded. Then, the first draft of the mini-review will be due mid-semester. A key part of communicating is giving and receiving criticism. Thus, each student will be randomly paired with a partner, and each student will provide their partner with peer review on the first draft prior to submitting the assignment to the instructor mid-semester. This will enable students to help each other, while learning how to criticize, and take criticism, effectively. Student edits to writing (e.g., grammar and style) and revisions to content will be informally graded. The instructor will then provide comments and edits to this document, grading it on both the writing (e.g., grammar and style) and content (30% of writing grade). **2)** Students will have the rest of the semester to revise this document (i.e., your second mini-review will be an updated/edited version of the first). This final document will be graded again on the writing and on content, with specific emphasis on whether the student revised the document to address the instructors formal comments and criticisms of the original draft (30% of the writing grade).

Mini-reviews must be a minimum of 8, 1.5-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 12 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 topic. 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? See the formal writing rubric for explicit information on the areas that will be assessed.

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.

Some comments on grading (see the formal rubric):

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:

3. Do you provide sufficient background and summary statements to give the reader the big picture?
4. Do you provide basic experimental details to support the statements you make?
5. 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:

6. Are all your stated facts correct?

7. Have you cited the appropriate references?
8. Have you correctly interpreted experimental results?

Creativity:

9. Have you commented on the significance of the findings you present?
10. 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 (single-spaced) 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 other writing assignments (15% short review/handouts, 40% mini-reviews, 20% grant proposal). Importantly, I will take the time to give comments and edits that will help improve your proposal into something you can submit to a funding agency 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.