The Human Microbiome (BIOL F494)
Fall 2016 Syllabus

Prerequisites: BIOL 260, STAT 200X

Credits: 4

Location and meeting times:
- Lectures (Murie 107): Tues/Thurs 11:30 AM - 1:00 PM
- Labs (Murie 206): Thurs 2:00-5:00 PM

Instructor information
- Dr. Devin Drown
  - Email: dmdrown@alaska.edu
  - Phone: 907-474-2602
  - Office Hours (224 WRRB): Weds 10-11 AM or by appointment

Course readings/materials
Course readings will consist of papers from the primary literature. There is no required textbook for this course. Other course materials: I will post readings (as PDFs or web links) on the course Blackboard site.
Blackboard Site (http://classes.uaf.edu/): Your grades will be recorded on this site and I encourage you to check that all grades are entered here and in agreement with those on your returned work. Copies of the course syllabus (including the lecture and lab schedules) will also be posted on this site.
Recommended Books:

Course description
It is now widely recognized that humans are host to a diverse assemblage of microbes (Blaser 2014b). This associated microbiota impacts the behavior, physiology and fitness of their host. The goal is to broadly explore the biology of host-associated microorganisms. In the process, we will address humans as hosts and include model and non-model systems as tools for research in this complex field.

Course Goals
This course will cover research questions on the ecology and evolution of host-associated microorganisms. Additionally, we will explore research methods and tools used to collect and analyze microbiome data. It will draw on the information you have gained in other courses and should also assist you in finding links between seemingly disparate fields of biology. Therefore another goal of this course is to expose UAF biology students to a more advanced level of study and prepare them to go on in biology-related fields. Understanding the role of the human microbiome is an important missing component of current investigations of the human health, so much so that the NIH started the Human Microbiome Project (HMP) in 2007.
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Student Learning Goals
The successful student will complete this course with a variety of new knowledge and skills. By the end of the course, students will be able to:

- Discuss what a microbiome is and where it is found
- Discuss the ecology and evolution of host-associated microbiomes
- Discuss how the microbiome is related to health and disease.
- Apply current research methods of microbiome investigation

More broadly, students should be able to demonstrate an ability to:

- Find and explore and critically review the relevant literature
- Carry out the investigations, including collecting and analyzing data
- Draw valid conclusions from the analysis of the data
- Discuss the relevance of the conclusions in the context of previous findings

Oral communication student learning objectives
Students will develop public oral communication skills incrementally:

- Each week, students will facilitate or participate in oral discussions.
- The instructor, and peers, will provide feedback on all oral presentations.

To develop their oral communication skills:

1. Students will prepare at least two oral presentations. One is our symposium presentation of the course microbiome research project. This 20-minute presentation will follow standards typical in the biological sciences (see Symposium Presentation for more details). In addition, students will act as discussion facilitators for at least one (more likely two) week. The facilitator will choose core papers and background reading on a subject. The facilitator will engage the students in a discussion during class time using feedback from the thought pieces. See Discussion Facilitator for more details.

2. All oral presentations will involve feedback (questions and answers) from the audience. This will include feedback from peers (see Symposium peer evaluation).

3. If possible, the final presentation will be recorded in order to provided reflective feedback on oral communication effectiveness and presentation techniques.

4. The final project presentations will be presented at an open forum in a mini symposium called “Microbiomes Under the Midnight Sun (MUMS)”. Members of the department and school (CNSM) will be encouraged to attend this symposium to be held in the Murie Building.

5. The presentations will follow organization typical of biology (e.g. see guidelines detailed in Symposium presentation and Discussion Facilitator).

6. The final project presentations will involve visual aids (e.g. PowerPoint or Google Slides). Discussion facilitators may also use visual aids such as handouts, but will be discouraged from using slides so as to enhance oral discussion of the subject matter.

7. The presentations will be evaluated by the instructor as well as peers (see Symposium peer evaluation). 15% of the final course grade is based on an oral presentation of the final course project. In addition, 5% of the course grade is based on a student’s oral communication skills while a discussion facilitator.

8. The instructor will provide instruction and modeling of best practices in oral communication throughout the course.
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Instructional Methods
This course will be a combination of instructor led lectures and activities and student directed discussions. The weekly lectures and activities will focus on providing students a background and context of the field. Student directed discussions will include two distinct communities: 1) a discussion with members of the class; 2) an online research discussion engaging the broader science community. See Weekly Readings for more details. Lab modules will provide a hands on introduction to the methods in common use for data collection and analysis of host-associated microbiomes. The course project will allow you to collect and analyze new data and finally present your research findings to the class.

Course policies

UAF Student Code of Conduct: Cheating, plagiarism and fabrication of data are unacceptable practices both in this course and in science more generally. All of your work should be your own and only your own unless it is explicitly assigned and completed as a group. I do not accept assignments written for other classes. Cheating, plagiarism or data fabrication will result in a course grade of F and possible referral to the University Disciplinary and Honor Code Committee. Also see the UAF Student Code of Conduct at http://uaf.edu/catalog/current/academics/regs3.html. If you have any doubt about whether a particular action constitutes cheating, plagiarism or fabrication of data, please seek clarification from the course instructor.

Late assignments: Lab exercises and homework will be due at the beginning of lab on the date indicated on the schedule (unless otherwise noted). Late assignments will not be accepted unless the student has received written approval from the course instructor.

Electronic devices: Participating in class activities should be your focus during lecture and lab. If there are extenuating circumstances that require you to be accessible by cell phone please discuss these with me ahead of time. You should not be checking email, browsing the web, or messaging during lecture or lab time.

Evaluation

Weekly Readings
For the second lecture period each week, we will discuss the current literature of host associated microbiomes. A different student each week will be responsible for being a discussion facilitator. The facilitator will choose core papers and background reading on a subject. These readings will provide examples of concepts/patterns we cover in lecture and demonstrate how microbiome research is practiced. You will be asked to read assigned journal articles from the primary literature. You will also have a written assignment (thought piece) on the article(s) due before the discussion. These readings will provide examples of concepts/patterns we cover in lecture and demonstrate how microbiome research is practiced. The facilitator will engage the students in a discussion during class time using feedback from the thought pieces.

Blog Post
There is a need to communicate beyond the ivory towers of our institutions. It is a worthy goal and a necessary component of doing science especially on a publically funded project. The greater use of science blogs is also a vital part of this communication. Making the science we do as public as we can is
an important part of public outreach. We need to make sure that our science and how we do it is freely available to the public and our peers. For this assignment, you will select a paper from the primary literature and drafting a blog post to be published on the course website.

Microbiome research project
Across many labs in this course, you will be collecting microbiome data from your environment. These lab modules provide a hands on introduction to the methods in common use for data collection and analysis of host-associated microorganisms. This research project will serve three purposes: 1) collect new data on the skin microbiome; 2) perform novel analysis; and 3) address a specific research question comparing your data to previously published data online.

Microbiome Under the Midnight Sun
To finish the class, we’ll host a mini-symposium, Microbiomes Under the Midnight Sun (MUMS). During this research symposium, each class member will present their own research findings based on their lab work on skin microbiome sampling.

Grading Breakdown
Successful completion of this class will require turning in all of the assignments on time. Each assignment is weighted as indicated below:

- Discussion facilitator: 20%
- Thought pieces (10 @ 2%): 20%
- Blog post: 20%
- Topic: 1%
- First Draft: 5%
- Revised Draft: 5%
- Peer Review (2 @2%): 4%
- Final post: 5%
- Microbiome research project: 20%
- Symposium Presentation: 15%
- Symposium peer evaluation: 5%

Overall course grades will be assigned on the following scale:

<table>
<thead>
<tr>
<th>Numerical Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0-100%</td>
<td>A</td>
</tr>
<tr>
<td>80.0-89.9</td>
<td>B</td>
</tr>
<tr>
<td>70.0-79.9</td>
<td>C</td>
</tr>
<tr>
<td>60.0-69.9</td>
<td>D</td>
</tr>
<tr>
<td>below 60</td>
<td>F</td>
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</tbody>
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Support Services
Students seeking additional help should discuss their concerns or needs directly with the instructor.

Disabilities Services
Any student needing accommodation of a disability should provide me with a letter from the Office of Disability Services within the first two weeks of class. The Office of Disability Services (http://www.uaf.edu/disability/ 208 Whitaker BLDG, 474-5655) also requires students contact them at least 3 days in advance of any exam for which they need special arrangements.
## Course calendar

<table>
<thead>
<tr>
<th>Week</th>
<th>Tuesday</th>
<th>Thursday</th>
<th>Lab</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>Gut Check &amp; Gutsy</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Humans as hosts</td>
<td>Human Microbiome Project</td>
<td>HMP Data Analysis and Coordination Center</td>
<td>Thought Pieces</td>
</tr>
<tr>
<td>3</td>
<td>Model systems, lessons from mice</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Bioethics and IRB</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Physiology, Obesity</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Science</td>
<td>Communication</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Metacommunities</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Data collection: Community module</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Non-model host systems, <em>Nasonia</em></td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Data collection: Community module</td>
<td>Blog topic</td>
</tr>
<tr>
<td>7</td>
<td>Coevolution Evolution, Hologenome</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Data collection: Troubleshooting</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Plant-microbe interactions</td>
<td>No Class</td>
<td>Work on Blog posts</td>
<td>Blog draft</td>
</tr>
<tr>
<td>9</td>
<td>Genomics</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Introduction to Bioinformatics</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Human Disease</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Data analysis module</td>
<td>Research project question</td>
</tr>
<tr>
<td>11</td>
<td>Behavior, Antibiotics</td>
<td><strong>Discussion</strong>: Student topic</td>
<td>Data analysis module</td>
<td>Blog revised draft</td>
</tr>
<tr>
<td>12</td>
<td>Blog peer review</td>
<td>Wordpress basics</td>
<td>HMP DACC data mining</td>
<td></td>
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<tr>
<td>13</td>
<td>Posting Final Blog</td>
<td>Thanksgiving</td>
<td>Thanksgiving</td>
<td>Blog final</td>
</tr>
<tr>
<td>14</td>
<td>Personalized medicine</td>
<td>Research project analysis</td>
<td>Research project analysis</td>
<td>Research project results</td>
</tr>
<tr>
<td>15</td>
<td>Microbiome mini-symposium</td>
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<td>Gut Check &amp; Gutsy</td>
<td></td>
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</tbody>
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