The Human Microbiome (BIOL F491)  
Fall 2019 Syllabus

Prerequisites: BIOL 260 and 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

Teaching Assistant: Taylor Seitz  Email: tjseitz@alaska.edu

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 microbiomes. 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 microbiomes. 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.
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 15-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 class section. 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 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 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, 15% 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.
Instructional Methods

This course will use a combination of lectures, discussions, and laboratories. The weekly instructor led lectures and activities will focus on providing students a background and context of the field. Student directed discussions will engage all members of the class. 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 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](http://uaf.edu/catalog/current/academics/regs3.html). If you have any doubt about whether an action constitutes cheating, plagiarism or fabrication of data, please seek clarification from the course instructor.

**Late assignments:** Thought pieces will be due by 5 pm the day before the discussion 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 class time.

Student protections and services

Student protections and services statement: Every qualified student is welcome in my classroom. As needed, I am happy to work with you, disability services, veterans’ services, rural student services, etc to find reasonable accommodations. 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/](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.

Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. As required, if I notice or am informed of certain types of misconduct, then I am required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you to resolve problems, please go the following site: [www.uaf.edu/handbook/](http://www.uaf.edu/handbook/).
Evaluation

Weekly Readings
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 publicly 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 microbiomes. This research project will serve three purposes: 1) collect new data on the skin microbiome and the microbiome of the built environment; 2) perform novel analysis; and 3) address a specific research question. This research project can serve as a general framework from which you can create a capstone project (see Capstone Project in Biological Sciences).

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.
The Human Microbiome (BIOL F491)

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

- Discussion facilitator: 15%
- Thought pieces (15 @ 2%): 30%
- Blog post: 20%
  - Topic: 1%
  - First Draft: 5%
  - Revised Draft: 5%
  - Peer Review (2 @2%): 4%
  - Final post: 5%
- Microbiome research project: 15%
- 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>
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<tbody>
<tr>
<td>90.0-100%</td>
<td>A</td>
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<tr>
<td>80.0-89.9</td>
<td>B</td>
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<tr>
<td>70.0-79.9</td>
<td>C</td>
</tr>
<tr>
<td>60.0-69.9</td>
<td>D</td>
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<tr>
<td>below 60</td>
<td>F</td>
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Capstone Project in Biological Sciences

The intent of the Biological Sciences capstone project is to integrate knowledge and skills learned in previous courses, including scientific knowledge, quantitative literacy, and communication skills, and to apply these products of the university education to a creative activity. For a biologist, a fundamental expression of applied knowledge, creativity, and critical reasoning is to engage in scientific inquiry. The capstone project in Biological Sciences consists of a mentored research project on a biological topic that is completed in the junior or senior year.

How can I satisfy the capstone requirement? Microbiome research project!

A student may perform a capstone project within a designated capstone course in Biological Sciences. Typically, the capstone course instructor will introduce one or several model study systems and methodologies that will form the basis for the student’s project. The course instructor will assist the student to design a study and analyze the results. The capstone requirement within a course will be fulfilled only if the capstone project itself is evaluated as adequate or better for all criteria identified on the Final Evaluation of Capstone Projects rubric. It is expected that the capstone project will constitute only a portion of the course grade. Thus, it is possible for a student to pass a capstone course without receiving credit for the capstone project, and to receive credit for the capstone project without passing the course.

Students intending to complete their capstone should register for BIOL F400

Regardless of how the capstone project is completed, you must signal your intent to complete the capstone project within a semester by enrolling in BIOL F400, Capstone Project. BIOL F400 is not a traditional course. It costs nothing, confers no credit, and requires no additional work. Rather, it is a way for the administration to track which students are in the process of completing their capstone projects, and which have successfully completed a project and therefore have satisfied the capstone requirement for graduation.

For general information on the Capstone Project in Biological Sciences please refer to the website

https://www.bw.uaf.edu/undergraduates/capstone.php

All capstone projects are assessed using a common set of expectations also found on the Capstone website:

Specific Capstone Project requirements

- The capstone project must be chosen by the student in consultation with a faculty mentor.
- The faculty mentor must approve the project before work begins.
- The project must include evaluation of data.
- There must be three forms of communication.

1. **Written report:** All capstone projects must include a written assignment. This is typically a formal report of the study goals, methods, and findings written as a scientific paper, but may in some cases be a research proposal. It is recommended that written assignments are a minimum 8 double-spaced pages (excluding figures and references) and contain at least 10 references.

2. **Oral presentation:** The findings of all capstone projects must also be communicated orally. Oral presentations can be delivered in class, at a scientific conference, at UAF Research Day, or in another instructor-approved setting. Slide presentations and poster presentations are the most common forms of oral presentation.

3. **Non-Technical Summary:** Communicating scientific results to the public is an important aspect of research. In addition to the formal written report, capstone research findings must be communicated in the form of a short, non-technical summary. The summary should consist of one or two paragraphs (1 page single spaced maximum) encapsulating the goal, approach, and findings of the study in language that can be understood by a non-scientist.

For this course:

Your **Microbiome Research Project** will be the general framework from which you will create your specific capstone project.

You can satisfy the **Written report** requirement by writing up your research project as a scientific report.

You can satisfy the **Oral presentation** requirement during the **final symposium presentation** which is based on your Microbiome Research Project.

Your complete **written report and the Non-Technical Summary** based on the Microbiome Research Project will be due on Friday during the last week of the semester after your symposium presentation. In order to help you succeed in writing up your capstone research, I would like you to turn in drafts of each section of your Written Report. All due dates are 5 PM on Friday of the week indicated. See instructions on Microbiome Research Project (Timeline of due dates).
# Course Calendar

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<tr>
<th>Wk</th>
<th>Tuesday (T)</th>
<th>Thursday (Th)</th>
<th>Lab</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>1</td>
<td>8/27 Microbiomes</td>
<td>8/29 Human Microbiome</td>
<td>Science Communication</td>
<td>TP (M), TP (W)</td>
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<td></td>
<td>Gut Check</td>
<td>Project</td>
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<td>2</td>
<td>9/3 (TP1) Model systems</td>
<td>9/5 (TP2) Obesity</td>
<td>Introduction to</td>
<td>TP (W) Citi Training module</td>
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<td>and QC</td>
<td>Bioinformatics</td>
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<td>3</td>
<td>9/10 Plants-microbes</td>
<td>9/12 (TP3) Personalized</td>
<td>Human Subjects</td>
<td>TP (M), TP (W)</td>
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<td></td>
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<td>Medicine</td>
<td>Research</td>
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<td>4</td>
<td>9/17 (TP4) Built Environment</td>
<td>9/19 (TP5) Student</td>
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<td>Discussion</td>
<td>DNA extraction</td>
<td>Blog Draft (F)</td>
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<td>5</td>
<td>9/24 (TP6) Student Discussion</td>
<td>9/26 (TP7) Student</td>
<td>Data collection:</td>
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<td>Discussion</td>
<td>PCR</td>
<td>Blog Revision (F)</td>
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<td>10/1 (TP8) Student Discussion</td>
<td>10/3 (TP9) Student</td>
<td>Qiime2/Dada/ASVs</td>
<td>TP (M), TP (W)</td>
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<td>Discussion</td>
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<td>10/8 (TP10) Student</td>
<td>10/10 (TP11) Student</td>
<td>Galaxy Bioinformatics</td>
<td>TP (M), TP (W)</td>
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<td>Discussion</td>
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<td>8</td>
<td>10/15 (TP12) Student</td>
<td>10/17 (TP13) Student</td>
<td>Revise Blog posts</td>
<td>TP (M), TP (W)</td>
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<tr>
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<td>10/22 Blog peer review</td>
<td>10/24 (TP14) Student</td>
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<td>10/29 WordPress basics</td>
<td>10/31 (TP15) Student</td>
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<td>11/7 (TP17) Student</td>
<td>Statistics and</td>
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<td>Visualization</td>
<td>Intro/Qs/Ps (F)</td>
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<td>11/14 (TP19) Student</td>
<td>Research project</td>
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<td>Discussion</td>
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<td>13</td>
<td>11/19 Microbiome mini-symposium</td>
<td>11/21 Microbiome mini-symposium</td>
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<td>11/26 Coevolution</td>
<td>11/28 Thanksgiving</td>
<td>Thanksgiving</td>
<td>Capstone (F)</td>
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<tr>
<td>15</td>
<td>12/3 Scientific Paper Review</td>
<td>12/5 Gut Check Revisited</td>
<td>Report Revisions</td>
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