OEB 290/MICRO 210
Spring 2024
Microbial Sciences: Chemistry, Ecology and Evolution

Course Description from Harvard College Catalogue**:**
This is an interdisciplinary graduate-level and advanced undergraduate-level course in which students explore topics in molecular microbiology, microbial diversity, host-microbe associations in health and disease, and microbially-mediated geochemistry in depth. This course will be taught by faculty from the Microbial Sciences Initiative. Topics include the origins of life, biogeochemical cycles, microbial diversity, and ecology. Course will limit enrollment to 20 students.

GOALS: Familiarize upper level undergraduate and graduate students with recent landmark and controversial works in the broad field of Microbiology, emphasizing the connection between Microbiology (or the research techniques used therein) and the diverse fields from which the students emanate – planetary and ecological sciences, medicine, engineering, *etc.* Provide content in a way that engages and elicits active participation of the students, and weaves a narrative that will capture their imagination and engender enthusiasm for the subject.

WHAT TO EXPECT: This seminar-style course meets once per week for 2 hours per session. Each weekly meeting is led by a different Boston-area microbiologist (most Harvard-affiliated), facilitating interaction between students enrolled in the course and leading local researchers. Each weekly meeting will focus on an area of interest/expertise of the seminar leader. The leader will usually give a short introduction to the topic at hand, but the bulk of class time will be spent on participatory discussion leading to in-depth coverage of 2-3 landmark or controversial papers on the designated topic. The seminar leader will work with students to bring out the following points:

1. What set the stage for this being a high impact, landmark work?
2. How do the technical approaches work? What are the underlying principles?
3. How were results interpreted? Are there alternative explanations?
4. What would be good follow up lines of experimentation?

Each session will also have 1-2 students designated as discussion guides. The role of discussion guide will be completed by each student at least once during the semester (details pending enrollment #), and the results will be incorporated into the participation grade. (See Grading section for details.)

LOCATION & FORMAT: The course will meet in MCZ 202 (26 Oxford St, Museum of Comparative Zoology) from 9:45 – 11:45 am EST. The course will meet in-person unless extenuating circumstances arise. Generally, the seminar leader will also present in-person.

CALENDAR:

2024 Date	**Seminar Leader**	**Topic**
Jan 26	Roberto Kolter	Intro to the Microbial World
Feb 2	Samantha Wellington Miranda	The Social Life of Microbes
Feb 9	Michael Gilmore	Microbes through Earth-time
Feb 16	Kim Lewis	Sophisticated Antibiotics from Nature
Feb 23	Emily Balskus	*TBA*
Mar 1	Roby Bhattacharyya	Antibiotic Resistance, Ancient and Modern
Mar 8	Colleen Cavanaugh	Microbial Symbioses
Mar 15	N/A	Spring Recess
Mar 22	Alex Kostic	Gut Microbes and Exercise Performance
Mar 29	Jon Clardy	Molecular Messages from the Gut Microbiome
Apr 5	William Hanage	Epidemiology in Infectious Disease Emergencies
Apr 12	Gary Borisy	Oral Microbiome Biogeography
Apr 19	Student Presentations	Proposal Topics

COURSE LEADERSHIP

Lead Instructor: Michael Gilmore, PhD (he/him/his)
Sir William Osler Professor, Harvard Medical School;
Massachusetts Eye and Ear Infirmary
Phone: 617-573-3845
Email: michael_gilmore@meei.harvard.edu

Teaching Assistant: Samantha Wellington Miranda, PhD (she/her/hers)
Phone: 970-214-9129
Email: welling@uw.edu (primary), mirandas@broadinstitute.org (secondary)

OEB 290/MICRO 210 Teaching Assistants will attend lectures, facilitate discussions, and collaborate with students on their individual term projects.

DEADLINES:

2024 Date	Proposal Item Due
Feb 16 (Friday)	Title and Specific Aims
Mar 8 (Friday)	Rough Draft
Mar 29 (Friday)	Final Draft
April 1 (Monday)	Proposals distributed for peer review
Apr 10 (Wednesday)	Peer Reviews
Apr 19 (Friday)	Presentations

COURSE CONDUCT

Policy on Collaboration

Discussion and the exchange of ideas are essential to academic work. For assignments in this course, you are encouraged to consult with your classmates on the choice of paper topics and to share sources. You may find it useful to discuss your chosen topic with your peers, particularly if you are working on a topic similar to that of a classmate. However, you should ensure that any written work you submit for evaluation is the result of your own research and writing and that it reflects your own approach to the topic. You must also adhere to standard citation practices in this discipline and properly cite any books, articles, websites, lectures, etc. that have helped you with your work. If you received any help with your writing (feedback on drafts, etc), you must also acknowledge this assistance.

Classroom Conduct

We welcome individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, and religious and political affiliations – and other visible and nonvisible differences. I am continually in the process of learning about diverse perspectives and identities. We expect you, as a member of this class and the greater Harvard community, to welcome and respect the diversity of thoughts, perspectives, and personal identities present within the group of individuals meeting in our classroom. Specifically, this means engaging respectfully in dialogue, supporting the participation of each member of the community, and giving thoughtful feedback when engaged in peer review.

Attendance Policy

Active involvement and attendance play a pivotal role in this discussion-based course. To accommodate reasonable absences, we incorporate a limited degree of flexibility into the participation score and students can regain partial credit for approved absences. We ask that students communicate as early as possible should a conflict arise.

EVALUATION:

Class participation (30%) Each student is expected to thoroughly read of the assigned literature. Students should also familiarize themselves with unfamiliar concepts/methods/etc. as needed, which may involve additional background reading as needed on an individual basis. That said, you are not expected to become expert and in-class questions are encouraged. For full credit, students should regularly contribute comments/questions/discussion points to weekly class discussions. **In class, a baseline expectation will be voicing 2-4 thoughtful comments per session.** Consistent effort throughout the semester is necessary for a strong participation score. We acknowledge that contributing verbally to discussions is intimidating in many cases; we invite and encourage you to make use of this class as a space to practice critical evaluation of the scientific literature in a supportive environment. To that end, you will be expected not only to contribute your own commentary, but to maintain space in the classroom for all contributions.

Discussion leading (10%) Students will serve as a discussion leader at least once during the semester. Discussion leaders will create a PowerPoint highlighting key background information and figures to help facilitate collective understanding of a landmark paper selected in advance by the seminar leader. The goal in discussion leading is not to present the information to the class, but instead to elicit discussion and input from your peers. A document containing guidance and tips for discussion leaders is available on the course website. Plan for each paper discussion to last for about 30-40 minutes.

Research proposal (40%) Over the course of the semester, each student is expected to write an original research project proposal. The format should be based upon that for an NSF GRFP, NIH Predoctoral Fellowship, and/or a comparable fellowship application relevant to your own sub-field. Ultimately, we want the development of this project to be a beneficial process for designing a document, or at least a version of a document, that you could feasibly use to apply for funding in the near future. Note that while most funding application packages require a suite of materials (personal Biosketch/CV, reference letters, timeline and/or budget documents), this OEB290 assignment focuses only on the project proposal. This is sometimes known as the project plan or research proposal. Each student will also complete reviews of their peers' research proposals, and completion of thoughtful peer review will be a part of the proposal grade.

Format rules (proposal) The proposal must be written using standard 8.5"x 11" page size, Times New Roman font for all text, no smaller than 11-point, except text that is part of an image, 1" margins on all sides, and no less than single spacing (approximately 6 lines per inch). It is recommended that the proposal include at least one figure; figures that serve as graphical abstracts illustrating key aspects of the research question and approach are encouraged. *Modeled on GRFP.*

Expected length (proposal): 2-3 pages (including figures but excluding references)

Guidance for specific aims (proposal): Consult the following references for crafting your specific aims: NIH Page on Drafting Specific Aims; Article on Intro to Specific Aims (out of University of Colorado School of Medicine)

Proposal Presentation (20%) Students will be expected to concisely present their proposals in short oral presentations at the end of the semester.

Timing (presentation) Each presenter will have a total time allotment dependent upon course enrollment. Presenters should plan for a brief presentation followed by Q&A. The moderator (TA) will alert each presenter when their time has passed so that they can offer final commentary and transition to questions.

Format (presentation) As with all OEB290 sessions in Spring 2024, the presentations will take place in person. The instructor and TA suggest a format that includes the following 4 slides: Intro/Rationale; Aims; Approach; Expected Results. You may also wish to have a summary or conclusion or impact side, to remind yourself to finish by re-connecting to the big picture question or problem you aim to address.

Tips (presentation) 1) Practice! The presentation time will feel short, especially if you've given longer talks. You can't expect to tell us everything. However, practicing goes a long way to ensuring you can effectively communicate your key points in this time frame. 2) Plan to include a concluding remark (examples: "Thanks for your attention." or "What questions do you have?" or "I'll take questions!") This

helps avoid any awkwardness between when you know you have finished presenting, and when the audience registers that you are done and starts asking questions.

Additional information for students enrolling through HMS:

Academic Integrity
All work in this course is governed by the academic integrity policies of Harvard Kenneth C. Griffin GSAS (https://gsas.harvard.edu/policy/academic-integrity) and HMS (https://issuu.com/hmsgraduateeducation/docs/handbook_updates_all_22-23_gc?fr=sNzY5YTUxODU3Njk – 3.09 Academic Dishonesty and Plagiarism). It is the students' responsibility to be aware of these policies and to ensure that their work adheres to them both in detail and in spirit. Unless otherwise specified by the instructor, the assumption is that all work submitted must reflect the student's own effort and understanding. Students are expected to clearly distinguish their own ideas and knowledge from information derived from other sources, including from conversations with other people. When working with others you must do so in the *spirit of collaboration*, not via a unidirectional transfer of information. Note that, unless it is part of the assignment, sharing or sending completed assignments to others will nearly always violate this collaborative standard. If you have a question about how best to complete an assignment in light of these policies, ask the instructor for clarification.

Community Standards
HMS is committed to supporting inclusive learning environments that value and affirm the diverse ideas and unique life experiences of all people. An equitable, inclusive classroom is a shared responsibility of both instructors and students, and both are encouraged to consider how their own experiences and biases may influence the learning environment. This requires an open mind and respect for differences of all kinds. Students are encouraged to contact the course director if they are experiencing bias or feel that their learning experience – including a course's content, manner of instruction, or learning environment -- is not inclusive. Curriculum Fellows, program administrators and directors, the Harvard Kenneth C. Griffin GSAS Office of Equity, Diversity, Inclusion & Belonging (https://gsas.harvard.edu/diversity), the Office for Gender Equity (https://oge.harvard.edu/), and the Ombuds Office (https://harvardombuds.harvard.edu/) are also available to discuss your experiences and provide support. Additionally, students can utilize Harvard's Anonymous Reporting Hotline (https://reportinghotline.harvard.edu/) to report issues related to bias.

Reasonable Accommodations
As an institution that values diversity and inclusion, our goal is to create learning environments that are usable, equitable, inclusive and welcoming. Harvard University complies with federal legislation for individuals with disabilities and offers reasonable accommodations to qualified students with documented disabilities and temporary impairments. To make a request for reasonable accommodations in a course, students must first connect with their local disability office. The primary point of contact for Harvard Kenneth C. Griffin GSAS students is the Disability Access Office (https://aeo.fas.harvard.edu/). The HMS Director of Disability Services, Timothy Rogers (timothy_rogers@hms.harvard.edu) is another potential source of accommodation information for PhD students and is the primary contact for MD and master's students.

Accommodations are determined through an interactive process and are not retroactive. Therefore, students should contact their local disability office to initiate the accommodation process as soon as possible, preferably at least two weeks before accommodations are needed in a course or immediately following an injury or illness. Students are strongly encouraged to discuss their needs with their instructors; however, instructors cannot independently institute individual accommodations without prior approval from the disability office. Student privacy surrounding disability status is recognized under FERPA. Information about accommodations is shared on a need-to-know basis, and with only those individuals involved in instituting the accommodation.

Academic and other Support Services
We value your well-being and recognize that as a graduate student you are asked to balance a variety of responsibilities and potential stressors: in class, in lab, and in life. If you are struggling with experiences either inside or outside of class, there are resources available to help. The Harvard Kenneth C. Griffin GSAS Student Services Office, stuserv@fas.harvard.edu or 617-495-5005 is available to assist students navigating academic or personal difficulties and connect them to university resources. HILS PhD students have access to free academic tutoring, arranged through the DMS office. A variety of academic support services are also available to Harvard Kenneth C. Griffin GSAS students through the Academic Resource Center

(https://academicresourcecenter.harvard.edu) and the Writing Center and Communications Lab (https://communicate.gse.harvard.edu/).

All students have access to Counseling and Mental Health Services (CAMHS) available in Longwood, Cambridge or remotely via webcam or phone. The use of CAMHS is included in the student health fee, regardless of insurance, at no additional cost. More information is available at https://camhs.huhs.harvard.edu or by calling the main office at 617-495-2042. Urgent care can be reached 24/7 at 617-495-5711.