

SYLLABUS - ENVIRONMENTAL MICROBIOLOGY 425/525
FALL 2013, Tu/Th 11:00-12:15, Marley 230

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OFFICE HOURS: Open door policy, appointment recommended

TEXT: Environmental Microbiology, 2nd Edition (Maier, Pepper, Gerba) - required

D2L: Class notes and other goodies available

COURSE DESCRIPTION

The objective of this course is to provide a basic understanding of environmental microbiology including: the functional diversity of microorganisms in the environment in relation to human welfare and ecosystem health, microbial interactions with pollutants in the environment and the fate of microbial pathogens in the environment. Topics covered include microbial environments, detection of bacteria and their activities in the environment, microbial biogeochemistry, bioremediation, and water quality.

GENERAL COURSE OBJECTIVES

- 1) To learn the basic principles of environment microbiology and be able to apply these principles to understanding and solving problems in water quality and bioremediation.
- 2) To become familiar with current research in environmental microbiology.
- 3) To learn how to read and contextualize current research articles.

GRADING

A total of 450 points can be earned. Grades will be assigned on the following basis: 90-100% will earn an A, 80-90% will earn a B, 70-80% will earn a C, and 60-70% will earn a D. Exam grades may be curved.

Points will be earned as outlined below:

1. Exams (300 points = 5 × 60pts)

Five objective exams (multiple choice/fill in the blank), each worth 60 points. The fifth exam will be given during the scheduled Final Exam time but will not be cumulative.

2. Homeworks (50 points = 5 × 10pts)

Approximately 5 homeworks will be assigned during the semester.

3. Essay (50 points = 2 × 25pts)

Twice during the semester, each student will read 1 (425) or 2 (525) scientific articles related to the current lecture material, from a provided list of possibilities. They will also read the relevant textbook material related to the topic(s) covered in the paper(s). Additional research (e.g. web searches and reading) is welcome but not required. Each student will write 1-page essay (Arial 10-pt font, single-spaced), summarizing the article(s) and placing it in context. The essay must include:

- An introduction of the research topic and its importance, **and** an explanation of how the paper(s) contributes to the research topic - what are the take-home points the paper(s) makes. (1-2 paragraphs)
- A description of the approach the authors took - what experimental design and methods were used (summarized, not detailed!) - and do you think they were appropriate? Are there other methods you think might have been useful or better? (1 paragraph)
- Present the next experiment or analysis that you think should be performed (your original idea) to follow the paper(s). (1 paragraph).

Tips for coherent writing:

- **Make an outline first. It gets your ideas down and organized. Not starting with one can lead to a jumbled mix of concepts without clear logical flow.**
- **Use concise, direct language. Avoid run-on sentences.**
- **Always check your spelling and grammar.**
- **Topic sentences (e.g. see <http://www.writingcentre.uottawa.ca/hypergrammar/partopic.html>) are key to good writing.**

In addition, sources must be cited and a complete and correct bibliography (see example below) must follow the essay (not included in the 1-page limit). Cite: (i) the focal paper(s) you read, (ii) the particular chapters of the textbook (include section #) that provided any critical background information (iii) any web pages or additional sources of information you used.

Cite sources in your actual essay where appropriate to support your statements (just as is done in the paper(s) you are reading). You can do this numerically to save space or in the longer format, eg for the example reference below, you might say something like, "caves harbor phylogenetically distinct microbial lineages (Holmes et al 2001)."

Bibliographic citation example; feel free to use the citation format of any major journal.

Holmes, A.J., N.A. Tujula, M. Holley, A. Contos, J.M. James, P. Rogers, and M.R. Gillings. 2001. Phylogenetic structure of unusual aquatic microbial formations in Nullarbor caves, Australia. *Environmental Microbiology*. 3:256-264.

Essays must be turned in *electronically* on D2L in .docx (MS Word) format. You are strongly encouraged to engage in peer-editing of a draft before turning in your final version.

Essay Grading Criteria:

Topic introduction & research contextualization	/4
Summary of key take-home points of paper(s)	/4
Summary of approach / key methods used	/4
Proposed experiment / next step	/4
Overall writing clarity and organization	/5
Spelling & grammar	/2
Referencing	/2

4. Poster Presentation (50 points)

Graduate students will each give a poster in a class-wide poster presentation. Undergraduates will be the "audience" and will provide feedback to the poster presenters on forms that will be provided.

The poster should cover some intriguing aspect of Environmental Microbiology. The poster can be done on the same topic as the essay. These posters can be based on your research project or informational (e.g., based on one of your essay topics). In either case the poster should present the data and findings uncovered in the research (or essay), as well as an argument for the validity and importance of the research. An informational poster should contain the following:

- (1) An informative title
- (2) An introduction or statement of the topic
- (3) A methods section, if appropriate
- (4) A results section showing the key data
- (5) A discussion section presenting the conclusions
- (6) References

Some general information on putting together a poster

- An effective poster advertises your research. It combines text and graphics to make a visually pleasing presentation.
- Place text under clear headings. If you draft your poster text and discover a long block of text, think about ways to break the text into bulleted or numbered lists.
- Posters condense a lot of information so the tricky part is to determine what information is really necessary for your presentation. If you try to show too much information, your audience will not read your poster completely. If you show too little information, your audience may not get key information.
- An audience will take in visual information more quickly than they can read text, so use graphics whenever you can on a poster.
- As you create your poster, keep asking yourself: Have I presented the most important information for the audience? Is there any way that the audience could misunderstand the key points I have presented?

Poster Grading Criteria

<u>Research Poster</u>		<u>Informational Poster</u>	
Statement of objective	_____ /10	Statement of concept/objective	_____ /10
Background information	_____ /5	Background information	_____ /5
Experimental design/problem description	_____ /5	Concepts presented logically	_____ /5
Figures/Tables	_____ /5	Suitability of figures/tables used	_____ /5
Conclusion/Summary	_____ /5	Conclusion/Summary	_____ /5
Creativity	_____ /5	Creativity	_____ /5
Presentation easy to follow?	_____ /5	Presentation easy to follow?	_____ /5
Mastery of information presented in poster	_____ /10	Mastery of information presented in poster	_____ /10

COURSE POLICIES

Attendance policy

It is required that students attend class. Information will be provided that will be critical to student performance. Students are responsible for meeting all deadlines and examinations outlined in this syllabus. Assignments will not be accepted late under any circumstances, they may however, be turned in early. Missed exams may not be made up except for special circumstances such as for health reasons, the instructor must be notified of an absence prior to the exam.

Incomplete grade policy

Incomplete grades will be given only in accordance with University policy which states "The grade of I may be awarded only at the end of a term, when all but a minor portion of the course work has been satisfactorily completed. The grade of I is not to be awarded when the student is expected to repeat the course; in such a case, a failing grade must be assigned. Students should make arrangements with the instructor to receive an incomplete grade before the end of the term. If the incomplete grade is not removed by the instructor within one year (the last day of finals one year later), the I grade will convert to a failing grade."

Academic integrity

Conduct prohibited by the University of Arizona Code of Academic Integrity consists of all forms of academic dishonesty (<http://w3.arizona.edu/~studpubs/policies/cacaint.htm>). Any instance of such will be dealt with according to relevant University policies.

LECTURE SCHEDULE

<u>DAY</u>	<u>DATE</u>	<u>PROF</u>	<u>TOPIC</u>
T	8/27	RM	Introduction, scope, relevance, brief history
Th	8/29	RM	Microbial growth in the environment
T	9/3	VR	Microbial habitats - air
Th	9/5	RM	Microbial habitats - soil
T	9/10	RM	Microbial habitats - soil
Th	9/12		Exam 1
T	9/17	VR	Microbial habitats - water
Th	9/19	VR	Microbial habitats - water
T	9/24	VR	Sample collection/processing
Th	9/26	VR	Cultural and microscopic methods
T	10/1	RM	Physiological methods
Th	10/3		Exam 2
T	10/8	RM	Immunological methods
Th	10/10	VR	Nucleic acid-based methods
M	10/14		Essay 1 due on D2L
T	10/15	VR	Nucleic acid-based methods
Th	10/17	VR	Environmental/waterborne pathogens
T	10/22	VR	Environmental/waterborne pathogens
Th	10/24		Exam 3
T	10/29	VR	Wastewater treatment
Th	10/31	VR	Indicator microorganisms/Disinfection
T	11/5	VR	Biogeochemical cycling - carbon, nitrogen, sulfur cycles
Th	11/7	VR	Biogeochemical cycling - carbon, nitrogen, sulfur cycles
M	11/11		Essay 2 due on D2L
T	11/12	RM	Biogeochemical cycling - carbon, nitrogen, sulfur cycles
Th	11/14		Exam 4
T	11/19	RM	Biogeochemical cycling - carbon, nitrogen, sulfur cycles
Th	11/21	RM	Biogeochemical cycling - carbon, nitrogen, sulfur cycles
T	11/26	RM	Microbes and organic pollutants MONDAY 11/25 ESSAY #2 DUE
Th	11/28		THANKSGIVING BREAK
T	12/3	RM	Microbes and organic pollutants
Th	12/5	RM	Microbes and metals
T	12/10	RM	Poster Session

Maier out of the office

Rich out of the office

FINAL: Wednesday 12/18 **FIFTH HOUR EXAM: 1:00 - 3:00 PM**