GRADUATE SEMINAR IN
ENVIRONMENTAL MICROBIOLOGY AND MICROBIAL ECOLOGY

An invitation to become Magellan for a semester:
Learn at the cutting edge of exploration in the microscopic world

SWES 696E, 1 unit, Spring 2014
2 hours, time TBD based on attendees’ availability, location TBD
First class meeting Wednesday 1-3, the first week of classes

Instructor
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Saguaro Hall 309

Course Description
Current understanding of environmental microbiology and microbial ecology is rapidly increasing, and staying on top of the latest paradigm-shifting scientific discoveries is critical to early career success. Also essential to success is the ability to lucidly present and discuss scientific ideas. In this graduate seminar (open to advanced undergraduates with instructors’ permission) we will select and discuss recent journal articles that present critical new discoveries or theories in these fields, or which describe important model ecosystems or organisms for understanding broader environmental microbial ecosystems. Particular attention will be paid to transformative new methods, such as meta-omics (-genomics, -transcriptomics, and –proteomics) and new fluorescent in situ hybridization (FISH) derivations, as well as key analytical, conceptual, and presentational advances. Journal club-style readings and discussions require active participation. Graduate students from diverse backgrounds are welcome, and postdoctoral researchers and advanced undergraduates are welcome with instructor permission.

Course Objectives
This course contributes to SWES graduate training in speaking and presentation skills, with instructor and peer feedback on improving individuals’ presentation skills. A major goal of this course is to broaden and strengthen participants’ knowledge of recent advances in environmental microbiology and microbial ecology. The course also aims to improve participants’ objective analysis and discussion of the literature, so that they can more quickly identify the key novel findings of papers and the places in their methods and logic where caveats are often hidden. In addition, connecting novel findings, methods, and ideas to the groups’ own systems of study will be highly encouraged during the latter part of discussion.

Expected Learning Outcomes
By the end of this course, you will have improved your scientific presentation and discussion abilities. You will be comfortable reading primary literature in these fields, and be familiar with the jargon and major methods involved. You will be more comfortable discussing new discoveries and asking questions about their validity. You will also have strengthened the habit of asking how new discoveries and methods apply to your own work or that of friends and colleagues.
**Schedule**

At the start of the semester students will search for and select a recent high-impact article to present, in consultation with instructors.

Selected articles might cover topics such as (but not limited to):

- The human microbiome: ecosystems and communities of the human body
- Using the Acid Mine Drainage system work as a model roadmap for exploring novel microbial ecosystems
- What is photoheterotrophy anyway, and how important is it?
- New approaches to linking microbes to their functions, such as meta-omics, FISH-SIMS, etc.
- “Built environment microbiology”: the influence of building architecture on microbial inhabitants
- Dealing with the deluge of data: new methods for visualizing, analyzing and integrating high-throughput data and metadata
- Single-cell sequencing: promises and caveats. And is it already passé, due to informatics advances?!
- A new Phylum, the Thaumarchaeota
- For C-cycling with think of photosynthesis (by both plants and microbes), but chemoaotrophy is emerging as an important driver of C fixation: what is the latest quantitative portrait of its importance on the planet?
- Our expanding understanding of Archaeal ammonia oxidizers
- Life at really low Reynolds number: breakthroughs in understanding how microbial cells interact with their physical environment at micro- and nano-scales

**Student Presentations/Papers**

Grading is based upon attendance, participation and summaries. Each week all students will bring a concise (e.g. 1 paragraph) summary of that week’s paper’s key points, its notable successes or failures of communication, and a list of at least 3 questions about the work. Once or twice during the semester, depending on enrollment, each student will present paper(s) and lead discussion. Discussion participation is expected and required for a passing grade.

**Exams**

There are no exams for this class.

**Grading**

Your final grade will be determined by total number of points accumulated from the weekly write-ups, the presentation, and class participation.

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<td>Write-ups</td>
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<td>Presentation(s)</td>
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<td>Class Participation</td>
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**Grade Scale**

A: 90-100 %, B: 80-89 %, C: 70-79 %, D: 60-69 %, E (fail): 0-59 %

**Textbooks**

None required.

**Suggested Reading**

Readings will be from the primary literature, determined during the course and distributed electronically.

**Policy on Expected Classroom Behavior**

Due to the interdisciplinary nature of this seminar, a good classroom attitude is critical – come ready to learn and to share your own knowledge graciously. Vigorous colloquial debate is encouraged, and expected. Laptops are allowed in class but checking email is not. Each
student is expected to attend every class session; however, all holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion, and absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

Policy Against Plagiarism  http://dos.web.arizona.edu/uapolicies

Policy Against Threatening Behavior  http://policy.web.arizona.edu/~policy/threaten.shtml

Academic Integrity
Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. This principle is furthered by the Student Code of Conduct and disciplinary procedures established by ABOR Policies 5-308 - 5-403, all provisions of which apply to all University of Arizona students. For further information, please see: http://w3.arizona.edu/~studpubs/policies/cacaint.htm.

Special Needs and Accommodation Statement
Students who need special accommodation or services should contact the SALT (Strategic Alternatives Learning Techniques), the Center for Learning Disabilities (SALT Center, Old Main, PO Box 210021, Tucson, Arizona 85721-0021, (520) 621-1242, FAX (520) 621-9448, TTY (520) 626-6072), http://www.salt.arizona.edu/, and/or the Disability Resources Center, 1540 E. 2nd Street, PO Box 210064, Tucson, Arizona 85721-0064, (520) 621-3268, FAX (520) 621-9423, http://drc.arizona.edu/. The appropriate office must document the need for accommodations.

Evolving Syllabus
Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.