BIOLOGY 865
EXTREME (MICRO)BIOLOGY: *PHYSIOLOGICAL ADAPTATIONS TO LIFE IN EXTREME ENVIRONMENTS*
SPRING 2009

Wednesdays, 10:10 – 12:00 p.m., HH 644

Instructor: Dr. José R. de la Torre
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Office Hours: Wednesdays 2 – 4 p.m.

Course Description:

Over the past few decades, we have come to appreciate that microbial organisms account for a substantial proportion of the Earth's biomass. Indeed, few places on the surface of our planet can be considered devoid of life and microbial communities have even been found to thrive in environments previously deemed too extreme to support life. Evidence suggests that microbial communities in these environments may contribute significantly to the global biosphere and play pivotal roles in regulating biogeochemical nutrients cycles. In this course, we will be examining how life adapts to these extreme environments and what experimental tools we may use to better understand these communities. We will draw directly from primary research articles and develop focused mini-proposals to address compelling questions in the field.

Enrollment:

This graduate-level course is primarily intended for Microbiology graduate students interested in exploring the adaptation and physiology of microorganisms living in extreme environments. Under exceptional circumstances, advanced undergraduate students will be allowed to enroll. Enrollment will be limited to 10-15 students. ***In all cases, consent of the instructor is required for continued enrollment.***

Format:

- In the first week of class, we will jointly develop a list of topics to be explored by the class through presentations of primary research articles. These topics can be taken from the list provided by the instructor (see below), or may develop from discussions in class.
- Individual students will assign themselves to specific topics and, working with the instructor, will select a recently published primary research article of significant interest to the topic.
- Students will lead a critical discussion of the selected topic using the selected research article as a launching point. Presenting students are encouraged to request help from the instructor and/or classmates on how to organize their presentation and prepare visual aids.
- The selected research article must be provided to the rest of the class at least one week prior to the presentation. All students are required to write a brief summary of the article which is due before class on the day of the presentation. This summary should **BRIEFLY** address the following points:
  - *What is the general topic of the paper that is being presented?*
  - *Why is this general topic significant?*
  - *What is the significance of this particular paper? What "gap in our knowledge" is being addressed by this paper?*

  - *Include **three questions** that you have about this paper.*
- Each student will lead 1-2 discussions over the course of the semester, depending on the number of students enrolled in the class.
- Presentation will be evaluated by the entire class according to the following criteria:
  - *Preparation and organization of presentation.*
  - *Whether the presenter was persuasive and demonstrated an understanding of the material.*
  - *How well the speaker communicated (clarity, tone, audibility).*
  - *Usefulness of additional information and the degree to which the presenter relied on the projected images.*
  - *How well the presentation engages the audience*
  - *Overall performance of presenter.*
- Based on their interests and the material presented in the course, students will develop a mini-grant proposal. We will dedicate time throughout the course to discuss these ideas as a group in order to provide feedback and constructive criticism. Finalized versions of the proposals will be presented to the class and written up to turn in as final projects.

Potential Topics:

Possible topics to explore over the course of the semester include:

- *Physiological/metabolic/genetic adaptations to extreme environmental parameters such as:*
  - *Heat*
  - *Cold*
  - *High/low pH*
  - *Salinity*
  - *Anoxia*
  - *Pressure*
- *Population structures/dynamics of microbial communities in extreme environments*
- *Metagenomics of microbial communities in extreme environments*
- *Experimental approaches to studying microorganisms in/from extreme environments*
- *Relationship between extreme environments and the Origin of Life*
- *Biogeochemical cycles in extreme environments*

Grading:

Participation in class discussions	*15%*
Problem sets (~10 total)	*10%*
Research article presentation(s)	*25%*
Proposal presentation	*25%*
Written mini-grant proposal	*25%*
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Total	*100%*

Attendance:

Attendance is mandatory and class participation is an important part of the final grade. Students will be permitted only one absence over the semester. Subsequent absences will result in multiplicative 20% penalties. It will be impossible to pass the class with more than 2 absences.

Statement on plagiarism

Students are expected to maintain a high level of academic integrity in all work pursued at SFSU. ***Plagiarism will not be tolerated under any circumstances.*** Plagiarism is defined as either direct copying or loose paraphrasing of text from any published work (including online) without appropriate referencing, or use of another person's work or ideas without appropriate attribution (including fellow students). Any incidence of plagiarism will result in zero points for that assignment and will be reported to the Chair of the Biology Department, the Dean of the College of Science and Engineering, and the Office of Student Affairs. Consequences can include penalties up to expulsion from the University.

American with Disabilities (ADA) Accommodation

The University is committed to providing reasonable academic accommodation to students with disabilities. Students with disabilities who need accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by e-mail (dprc@sfsu.edu).

Important Deadlines for Add/Drop/Withdrawal:

Friday, February 20, 2009

Deadline to add or drop courses with instructor-issued permit number.

Friday, March 20, 2009

Deadline to request CR/NC grading option.

February 21 – April 24, 2009

Withdrawal from a course(s) is permissible only for serious and compelling reasons, documentation is not needed during this time period. The student will receive a "W" grade.

April 25 – May 15, 2009

Withdrawals are normally not permitted during this period except in cases of verified accident or serious illness where the cause of withdrawal is due to circumstances clearly beyond the student's control and where the assignment of an incomplete is not practical. Ordinarily, withdrawals in this category involves a total withdrawal from the University