
SIO128

Microbial Life in Extreme Environments

Prerequisites: BILD1-3 or consent of instructor

This course will highlight the weird and wonderful things microbes do to influence our lives and the characteristics of Earth. It is hoped that by highlighting the strangest of the strange that students will acquire a lifelong sense of fascination and wonder with the nature and diversity of the largely invisible microbial life forms present throughout the biosphere. Examples will include cloud formation, mineral precipitations, bacteria with rocket fuel in their membranes, giant microbes in fish guts, the viruses of viruses, radiation resistance in the Atacama desert, microbes that live off of the effects of radioactive potassium, how microbes that like high pH got into your laundry detergent, and microbial survival for millions of years in amber, brine inclusions and deep subsurface sediments.

Date	Subject	Student Presentation
Monday, March 28	Introduction to the class	
Wednesday, March 30	Thermophiles I	
Friday, April 1	Thermophiles II	
Monday, April 4	Psychrophiles	
Wednesday April 6	Halophiles	
Friday, April 8	Methanotrophs, Quiz 1	
Monday, April 11	Acidophiles	
Wednesday, April 13	Alkaliphiles	
Friday, April 15	Oil-eating microbes, Quiz 2	
Monday, April 18	Extremophile Biotechnology	
Wednesday, April 20	Low nutrient adaptation	
Friday, April 22	Mineral precipitation	
Monday April 25	Heavy metal resistance	
Wednesday, April 27	Air/aerosol microbes	
Friday, April 29	Midterm Exam	
Monday, May 2	Radiation resistance	
Wednesday, May 4	Ancient microbes	
Friday, May 6	Piezophiles	
Monday, May 9	Giant microbes	
Wednesday, May 11	Bacteria with organelles	
Friday, May 13	Giant viruses	
Monday, May 16	Deep subsurface	
Wednesday, May 18	Living off radioactivity	
Friday, May 20	Life in ice	
Monday, May 23	Subglacial lakes	
Wednesday, May 25	Stress responses	

Friday, May 27	Origin of Life/ Serpentinization	
Monday, May 30	Memorial Day Holiday	
Wednesday, June 1	Astrobiology I	
Friday, June 3	Astrobiology II	
Finals Week	Final Exam	

Grading:

Quiz (only the highest scoring quiz will be counted) – 10 points

First Exam – 80 points

Second Exam – 80 points

Extremophile microbial species powerpoint presentation – 5 points

Extremophile report – 25 points

Quizzes and exams: these will require multiple choice, true/false and short answer responses. The final exam is not comprehensive but rather based on the material covered since the midterm exam.

Presentation and report: each student will select a type of bizarre (aka extremophilic) microbial species or an extreme environment where life is either known or postulated to exist. For the presentation each student will present one visually stunning slide that indicates in a few bulleted points what is remarkable about the selected microbe or habitat. Each presentation can only be 1 minute. For the report students will elaborate on the selected microbe or habitat in a 5 page single-spaced report (Times 12 point font with 1 inch margins). It should be divided into a 150-200 word abstract indicating the key points of the paper, with the body of the report subdivided into 3-5 headings, with 3-5 figures and/or tables, and a list of 6-12 references. The references cannot refer to websites and must list only peer-reviewed scientific papers, such as those identified in a Web of Science search (http://apps.webofknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&SID=2DskDqdOpA3jLjWend3&preferencesSaved=). Students will be graded on the quality of their selected topic, the scholarship associated with its description and with adherence to the requirements listed above.

Class website: <http://ted.ucsd.edu>

Grading options: Letter or S/U