MICROBES AND THEIR ENVIRONMENT MICR 485 LECTURE

Instructor: Marek Kirs
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Lecture: MWF 11:30-12:20 PM
Location: WEB 104
Prerequisites: BIOL 171 and CHEM 272, or consent

Course description: Microbes are everywhere and they run our planet! They're in the air you breathe, in the soil you walk on, and in the water you swim. In this class, we will explore tremendous diversity of microbes and learn how these tiny organisms have the power to change their local environments and the whole planet. We will use a multidisciplinary and integrative approach to understanding of the continuum of life microbial life: viruses, bacteria, archaea, fungi and protists. We will learn how they function alone, in context of each other, with their hosts, and together how they cause huge changes in both natural and human-influenced environments and how this impacts our daily lives.

Course structure: The course consists of 3 hours/week lectures. There are 4 exams in total where each exam counts for 20% of your grade. Exams will assess your various thinking skills with multiple choice, short answers, true/false, fill in the blanks, matching, and short essays. There will be class discussions and case studies integrated into the lectures. The final project & presentation will be worth 15% of your grade.

Course objectives:
1. Acquire depth and breadth of knowledge about the biology of diverse groups of microorganisms that dwell in various environments, the roles that they play in manipulation of essential ecosystem processes, and how they contribute to overall environmental health.
2. Integrate important principles as well as methodologies from various disciplines within life sciences such as ecology, evolution, biochemistry, organismal biology, and genetics to explain microbial processes.
3. Analyze and contextualize the potentials of microorganisms and how they contribute as well as damage natural environments, affect human society, and affect the overall future health of the planet.
4. Develop solutions using microbiology to solve impending societal and environmental issues.
5. Demonstrate skills in speaking, listening, and questioning.

Student learning objectives:
1. Demonstrate understanding of microbiology from genes to ecosystems and how it is fundamental to environmental health.
2. Demonstrate the ability to identify problems and develop solutions using the fundamental principles associated with microbiology to solve agricultural and environmental issues.
3. Demonstrate proficiency in oral communication through group discussions and general classroom participation.

Textbook: Not required.

Makeups: Exams and quizzes may be made up but only with university accepted documents. It is at the discretion of the instructor to determine acceptable reasons for makeups outside of accepted documents. You must make prior arrangements if you know you will miss a class. It is up to the student to arrange a makeup with the instructor. Makeups must be taken prior to the next exam or quiz.

Academic integrity:

Cheating will result in a 0 score for exams and quizzes, and will result in disciplinary action. The class adheres strictly to UH Manoa's policies on academic integrity at http://www.catalog.hawaii.edu/about-uh/campus-policies1.htm

Grading components:

Attendance	5%
Exams (4)	80%
Final Presentation + Paper	15%
Total	100%

Letter Grade Assignment:

A+= 97-100, A= 93-96, A- = 90-92
B+ = 87-89, B = 84-86, B- = 80-83
C+= 77-79, C = 74-76, C- = 70-73
D+ = 67-69, D = 64-66, D- = 60-63
F = <60

MICR 485 Microbes and their Environment

Date	Lecture #	Module	Instructor	
January 13			Kirs	First day of instructions
January 15	1	Microbial Diversity	Kirs	Introduction. Biosphere and origin of life; Taxonomy, Systematics, and Nomenclature, Diversity
January 17	2	Microbial Diversity	Kirs	Bacteria & Archaea
January 20				**Martin Luther King Jr. Day (No class)**
January 22	3	Microbial Diversity	Kirs	Cyanobacteria, microbial eukaryotes
January 24	4	Microbial Diversity	Kirs	Fungi & Oomycetes
January 27	5	Microbial Diversity	Kirs	Viruses, including phages
January 29	6	Methods	Kirs	L1.Aseptic techniques, Water and Soil sample collection, dilution series, MPN, membrane filtration, spread and streak plates
February 31	7	Methods	Kirs	L2. DNA extraction
February 3	8	Methods	Kirs	L3. qPCR
February 5			Kirs	Review Session
February 7			Kirs	EXAM #1 (lectures 1-8)
February 10	9	Biogeochemical Cycles	Kirs	Carbon Cycle
February 12	10	Biogeochemical Cycles	Kirs	Carbon Cycle, Nitrogen Cycle
February 14	11	Biogeochemical Cycles	Kirs	Nitrogen Cycle
February 17	12	Biogeochemical Cycles	Kirs	Phosphate Cycle, Sulphur Cycle,
February 19	13	Biogeochemical Cycles	Kirs	Iron and other metals
February 21				**President's Day (No class)**
February 24	14	Methods	Guest	Methods in Water Microbiology #1
February 26	15	Methods	Guest	Methods in Water Microbiology #2
February 28	16	Methods	Guest	Methods in Water Microbiology #3
March 2			Kirs	Review Session
March 4			Kirs	EXAM #2 (lectures 9-16)
March 6	17	Environments	Kirs	Is everything everywhere?
March 9	18	Environments	Kirs	Water and Microbes
March 11	19	Environments	Kirs	Water Environments (Seas and Oceans)
March 13	20	Environments	Kirs	Freshwater Environments (streams, lakes, groundwater)
March 16				**Spring Recess (No class)**
March 18				**Spring Recess (No class)**
March 20				**Spring Recess (No class)**
March 23	21	Environments	online	Pollution of Aquatic Systems
March 25	22	Environments	online	Waterborne Pathogens, Disease Transmission and Global Change
March 27	23	Environments	online	Water Quality Regulations, Epidemiological Studies, QMRA.
March 30	24	Environments		Microbes in Water Treatment & Disinfection
April 1			online	Review Session
April 3			Online Laulima 11:30 AM	EXAM #3 (lectures 17-24)
April 6	25	Environments 2	online	Soil Microbial Ecology
April 8	26	Environments 2	online	Soil Habitat
April 10				**Good Friday (No class)**
April 13	27	Environments 2	online	Rhizosphere
April 15	28	Environments 2	online	Mycorrhizae
April 17	29	Environments 2	online	Coral microbiota
April 20	30	Environments 2	online	Human microbiota

April 22	**31**	Environments 2	online	Phytoplankton blooms and phycotoxins
April 24	32	Environments 2	online	Biodegradation and Bioremediation
April 27			online	Paper and Presentation Prep
April 29			online	Paper and Presentation Prep
May 1			online	Paper and Presentation Prep
May 4			online	Paper and Presentation Slides due
May 6				Review Session
May 11			Laulima: 12 AM (noon)	**EXAM 4 (lectures 25-32)**