

ENVIRONMENTAL MICROBIOLOGY

BSC 489/589 (3 hours) and BSC 489L/589L (Corequisite)(1 hour) (Spring 2004)

COURSE DESCRIPTION, TESTS AND OTHER POLICIES

Time and Place:

Lecture: Wednesday, Periods 7-8, 2 - 4:45 pm, JST 401

Laboratory: Monday, Periods 7-8 (2:00-4:45 pm), JST 405

Laboratory periods are positioned early in the week to accommodate the growth patterns of microorganisms. Formal experiments (see handouts) are conducted on Monday. Due to the complex nature of many of the experiments, you may occasionally be required to spend additional time outside the laboratory (Wednesday) to bring an investigation to a successful conclusion.

Textbook/Handouts:

Lecture: Manual of Environmental Microbiology (Hurst et al), latest edition.(Optional)

Laboratory: Section 9000 of the latest edition of Standard Methods for the Examination of Water and Wastewater. You are to obtain a copy of this section.

Tests and Grading Policies

Examinations valued at = to or > 100 points will be given during lecture and laboratory periods. Tests in lecture will be given on line via WebCT or as hard copy during the class periods. Test material will come from lecture or laboratory notes, handouts, internet sites, or specified readings. Undergraduate grades are distributed according to a university curve (90-100 A; 80-89 B, etc.); graduate grades are distributed as follows: 93-100 =A; 85-92 = B; 77-84 = C; 65-76 = D; 64 and below = F. If an undergraduate curve is implemented, this will occur only at the end of the course. Please pay attention to the drop date. After the drop date, I will not sign a drop slip.

Materials:

Please bring standard microbiological implements to the laboratory period such as a loop, slides, matches, lab glasses, lab coat (optional), wax pencil, etc.

Lecture/Laboratory Reports:

A optional lecture report on an environmental microbiology topic can be completed and presented as an InterNet presentation (guidelines on a following page). This optional lecture report (to be placed on the EM home page) is worth 50 points and calculated into the final grade. This report is to produced using Netscape Composer and presented to the instructor on a 3.5 or zip disc. In addition, each student is required to prepare 2 laboratory reports. Reports are to be typed on a word processor and presented to the instructor as a clean, final copy. Reports are to be brief (4-5 pgs) but complete, and demonstrate your understanding of the experiment and the significance of the results. Laboratory reports represent 50 points (25 pts per experiment) and will be applied to the laboratory average.

Attendance: You are required to attend all regularly scheduled classes. Attendance may or may not be monitored. If you come late for a class and the door is closed, knock and you will be allowed to enter the class. Please do not make a habit of coming late to class.

Disabilities: In accordance with University policy, if you have a documented disability and require accommodations to obtain equal access in this course, please contact the instructor at the beginning of the semester or when given an assignment for which an accommodation is required.

Students with disabilities must verify their eligibility through the Office of Student Disability Services (x5024)

Office Hours: Office 100B Chain Technology; Office Hours are on Tuesday, 10-11 am. You may also call for a scheduled appointment.

R.D. Ellender, Ph.D., Instructor of Record

Office: JST 609 (266-4720)

Environmental Microbiology Laboratories

January 6 [Laboratory Introduction and Review of Dilutions. WebCT course orientation].

January 13 [Adsorption of microorganisms to surfaces]

January 20 [USM Holiday]

January 27 [The Standard Plate Count]

*February 3 [Multiple Tube Testing (total and fecal coliform) (Lab report due in two weeks)]

February 10 [Membrane Filter Testing]

February 17 [Quantitation of fecal streptococci]

February 18 [Last day to drop without academic penalty]CHECK!!!!

February 24 [Lab Test No. 1 during the lab period]

March 3 [New Methods of Microbial Testing of Water]

March 10-14 [Spring Break]

March 17 [Field Trip in Hattiesburg (during class period)]

*March 24 [Biological Oxidation Demand;

March 31 [Microbiology of recreational water]

April 7 [Field trip to Gulf Coast (leave 12 pm return ~5:30 pm)]

April 14 [Aeromicrobiology;]

April 21 [Bioremediation field trip (leave 1 pm return ~5:00 pm)]

April 28 [Concentration of viruses from water Lab Exam No. 2]

May 2 (Friday) Last day of regular scheduled classes

May 5-9 [Final Examinations (489L/589L Final 5/5/02; 2-4:30; JST 405)]

* Laboratory Reports Required on these Experiments (25 pts each)

Environmental Microbiology Lecture Schedule

January 8 [Introduction to Environmental Microbiology; Microbes in the Natural Environment; Microbiology of unpolluted water; (Ch. 1,2,38)]

January 15 [Microbial Biodiversity; Biofilms; Microbial Cycles]

January 22 [The Indicator Concept Ch. 17-18]

January 29 and February 5 [Waterborne Pathogens (Ch. 17, 21)]

February 12 [Microbial Methods and Assessment of Wastewater Treatment (Ch 20, 24)]

February 19 [Activated Sludge, Trickling Filters, Anaerobic Digestion; Pond systems]

February 26 [Bioremediation: Introduction and Scope, Testing/Monitoring(Ch. 76,77); Examination 1; given in AKH 108 2-4 pm]

March 6 [Bioremediation: Genetic Exchange; Biodegradation; Polychlorinated biphenyls; Specific Examples (Ch 80,81,86,87,88,90)]

March 10-14 [Spring Break]

March 19 [Extreme Environments, The Archaea, Methane Hydrates, Ancient Bacteria]

March 26 [Subsurface Microbiology]; Examination 2; given in AKH 108 2-4 pm]

April 2 [Environmental Virology (Ch. 8,17,21, 28)]

April 9 [Landfills microbiology (Ch. 40,41,58,60,65)]

April 16 [Aeromicrobiology (Ch. 67,68,69,72,74)]

April 23 [Applying the tools of molecular biology to environmental microbial issues (Ch. 47,48,54)]

April 30 [Examination 3; given in AKH 108 2-4 pm; Review and Course Evaluation]

May 2 [Last day of class for spring semester]

May 5-9 Final examination period 8 (Wednesday May 7, 2:00 - 4:30 pm in AKH 108)

Examinations given in AKH = Arthell Kelly Hall

ENVIRONMENTAL MICROBIOLOGY (BSC 489/589)
OPTIONAL INTERNET PRESENTATION

Summary: Undergraduates are to create a presentation that would last 15 minutes; 30 minutes required of graduate students.

Pictures/Net Sites: No specific number; use as many as you feel are necessary.

In this presentation, you must document the source of the information by reference to specific authors or in the case of copyrighted material such as pictures to the specific net sites. Citations can be incorporated into the body of the text or denoted in some other way. In other words, there must be an obvious link between the Net sites and your text. Use the actual URL as the reference. I must be able to follow your links. I do realize that net links change, but I also know that they do not change that fast.

example 1: ...in the viral replication pathway (<http://www.usm.edu/~ellender>).

Your choice of subject is critical. If you decide on a subject and you learn that the number of net sites is limited, switch topics. The topic you choose is your choice but I must approve the topic. It is best to do this early in the semester so that I can give you as much guidance as necessary. This is where the world is going, so get with it and enjoy the ride.

Please have your presentation ready by March 26, 2003. I will grade your presentation and the grading criteria will include overall quality of the presentation (15 pts), your use of graphic and reference materials (15 pts); the level of coverage of the topic (10 pts) and above all, your use of your imagination (10 pts). There is nothing more boring than a routine presentation. Use color and all of the other advantages of the Netscape Composer.

I expect you to use excellent grammar, to spell correctly, and to check your sentence structure. I expect presentations to be easy to read, and to follow a logical pattern. Jumbles of disjointed ideas will not be acceptable.

You may use any search engine you have or can find. I routinely use <http://altavista.digital.com>, google.com or the WebFerret. If you prefer another, have at it. I can give you the names of at least 5 additional search engines.

Elements of a Basic Presentation might include (in semi-basic order):

Title Section (Title, Author, Date, Class)
Objective of the Presentation
Introduction of the topic (why is this important)
Background of the topic (what has been done in the past)
Advantages/Disadvantages of the Process/Procedure/Microbial Population
Future Directions and Implications of this knowledge
References (as <http://> URLs)

Possible topics or subtopics from a more general heading are listed below. As you study this assignment, you will find many topics that interest you. Don't just jump in with one of the topics listed. Follow your own instincts and interests. In this way, the process will not be such a chore.

Microbiofilms
Bioremediation (You might focus on a specific compound)
Genetic exchange to degrade xenobiotic chemicals
Aerobic digestion of sludge
The value of microbes from extreme environments (extremophiles)
Genetic Ecology
The indicator concept - where are we going?
Bacteria and Viruses in open ocean water
Detection of Pathogenic microorganisms in water by molecular protocols
Aeromicrobiology

Microbial control of plant diseases
Significant Marine Mycobacteria
The treatment of Wastewater
Landfill microbiology
What can be done with treated wastewater sludge?
Remote sensing of microorganisms

Computer centers in the Technology Building (room 207), the Johnson Science Tower (room 205) and the library are equipped with Netscape and can be used to create your presentation. Within Netscape you can employ the Page Composer, with which you can readily create a presentation or homepage. Creation of the presentation can also be done with any up-to-date word processor since you are able to save your creation in html format. I do this all of the time and will be happy to demonstrate this for any of you whenever you request the time.