

- 26 Ecological Microbiology Chapters 5 and 25**
 We will examine roles of bacteria heterotrophic, autotrophic & chemoautotrophic bacteria in ecosystems
 Be sure to read 'Microbial Mining' -- pp 802 – 803
 Be sure to read *Redesigning Bacteria & G.M.O.'s* (p 226) and think about potential ecological impacts of genetically engineered microorganisms.

- Mar 5 Introduction to Bacterial Genetics Chapter 8**
 Topics on genetic mutation covered Chapter 7 (pp 188 - 199) are assigned reading; know all bold-faced concepts.
 Bacterial genetic recombination and plasmids will be our focus -- pp 205-217

Exam #2 over above material will be on Friday, Mar 23

12 SPRING BREAK

III. Microbiology and Human Health

- 19 Disease Process & Epidemiology Chapters 14 and 15**
 Various 'barriers to infection' discussed in class are in Chapter 16 on pp 447 - 450
 Descriptions of botulism and tetanus toxins are on pp 731 - 734
 also see brief essay *Clinical use of Botulism toxin* on p 397
 Discussion of Toxic Shock Syndrome can be found on pp 585-586
 Be sure to read *Infectious Diseases--Past, Present and Future* -- pp 405 - 407
 Discussion of Lyme disease occurs on pp 699 - 700
 Chap. 15 covers the field of epidemiology, and we will cover most of it

26 Disease Process and Epidemiology, cont.

- Apr 2 Controlling Infection and Spread of Bacteria Chapters 12 and 13**
 Much of Chapter 12 will be assigned reading, including the basic mechanisms of different chemical and physical antimicrobial agents; a study guide will be provided
 Be sure to read about irradiation and *The Great Irradiation Debate* -- p 788 - 789
 Kirby-Bauer and MIC tests (p 362) and the autoclave (pp 339 - 341) will also be covered in lab. We will cover some of the mechanisms of antibiotics, but you will not be responsible for all the details given on pp 365 - 379

- 9 Sexually Transmitted Diseases - Bacterial Chapter 20**
 We will cover bacterial STDs (pp 587 -- 597) now and viral diseases later
 Chlamydia life cycle is presented on p 258
 Be sure to read *Homo sapiens and Treponema pallidum -an evolutionary relationship* -- p 593

- 16 Food and Water Borne Pathogens Chapters 22**
 We will focus on bacterial food poisoning -- pp 651 - 662
 Review section on botulism on pp 732 - 734
 Also read section about giardiasis on pp 667- 669
 Be sure to read *Cholera around the world - and on our door step* -- p 65,
 Typhoid Mary -- p 654, and home canning p 342

Exam #1 over above material will be on Friday, APR 20

23 Virology and AIDS**Chapter 10**

Our focus will be on basic viral structure (pp 264 - 269) and replication (pp 278 - 287)
 you are not responsible the details of viral classification on pp 269 - 276
 Be sure to read *Emerging Viruses* -- p 276; and about ebola (p 708)
 Viral STDS are discussed on pp 598 - 604
 HIV and AIDS are described in Chapter 18 on pp 530 - 535
 Review *AIDS* sidebox on p 10
 Also read about virioids, prions and cancer -- pp 280 - 294
 and about mad cow disease and related illnesses on pp 736 - 739

30 Immunology**Chapter 17**

Since we only have a short period of time, we will only introduce some basic principles of immunology: e.g., innate vs acquired immunity; cell mediated vs humoral systems, and immunization

FINAL EXAM: Thursday, May 10, 8:30 AM

Class and Lab resources can be found at the Biol 202 Home Page at:
<http://www.marietta.edu/~spilatr/biol202/index202.html>

COURSE OBJECTIVES

The objectives of this course are for students to develop a fundamental understanding of the field of microbiology. Principal emphasis is placed upon learning the fundamental biological characteristics of microorganisms, and in particular, of the prokaryotes. However, significant emphasis is placed also upon the relationship of microorganisms and the field of microbiology to the broader sphere of human history, social, ethical, and medical issues.

OFFICE HOURS

Location: Bartlett Biology Building rm 161B, ext. 4748

Times: Mon. 8:30-9:30; Wed at 4:00

I will make every effort to be accessible at other times --just drop in.

If I'm busy, we can schedule another time at which we can meet.

ATTENDANCE POLICY

Attendance will be taken in lectures and laboratories. I must be notified at least ONE WEEK in advance if you need to miss a lecture or laboratory due to a field trip, athletic event, etc. Because of the nature of certain laboratory exercises, make-ups may not be possible, and no make-ups will be given for unexcused absences from laboratories. Extraordinary circumstances will be dealt with on an individual basis.

Students will need to periodically return at non-laboratory periods to complete an exercise or to observe results. There is adequate flexibility in the timing of these periods to accommodate most student schedules. Unavoidable conflicts should be discussed with me.

LABORATORY EXERCISES

Lab manual: *Laboratory Exercises in Microbiology*, Edition 13, 2007

<u>Date</u>	<u>Exercise</u>
Jan 23	Introduction
30 §	Bacteriological Techniques
Feb 6**	Microscopy
13 §	Bacterial Cytology
20	Microscopy/Cytology cont.
27**	Culture Media and Cultivation of Bacteria
Mar 6 §	Bacterial Metabolism Microorganism Practical
13	<u>SPRING BREAK</u>
20	Characterization of Indigenous Bacteria and Pathogens
27 §	Control of Bacterial Growth Gram Stain Practical
Apr 3**	Microbiological Analysis of Foods and Water
10 §	Virology and Bacterial Genetic Recombination
17	Identification of Unknowns Field trip to Hospital
24	Identification of Unknowns, con't Field trip to Hospital
May 1**	Clean up Unknowns Due

“” Quizzes Will Be Given at the Start of Lab Periods Indicated with a § Extra credit available for answering questions**

GRADING POLICY

Your final grade will be determined as follows.

Lecture exams	3 x ≈ 125	≈	375 points
Final lecture exam			200
Quizzes	4 x ≈ 25	≈	100
Laboratory grades		≈	190

			Total ≈ 865 points

Grading Scale

97 - 100%	= A+
93 - 96%	= A
90 - 92%	= A-
87 - 89%	= B+
83 - 86%	= B
80 - 82%	= B-
77 - 79%	= C+
73 - 76%	= C
70 - 72%	= C-
67 - 69%	= D+
63 - 66%	= D
60 - 62%	= D-
< 60%	= F

EXAMS AND QUIZZES

Exams and quizzes will cover lecture materials and assigned readings. The final exam will be comprehensive. I must be notified at least one week in advance if you cannot attend class the day of an exam or quiz due to an athletic event, field trip, etc, then, at which time we will arrange an alternative exam time. You may not be allowed to makeup an exam if I receive "last minute" notification. **There will be no make up exams for unexcused absences.** Extraordinary circumstances will be dealt with on an individual basis.

If you have special needs because of a documented learning disability or other disability, please see me immediately to discuss possible accommodations.

Academic Dishonesty

Academic dishonesty within the academic community is a very serious matter, because dishonesty destroys the basic trust necessary for a healthy education environment. Academic dishonesty is any treatment or representation of work as if one were fully responsible for it, when it is in fact the work of another person. Academic dishonesty includes cheating, plagiarism, theft, or improper manipulation of laboratory or research data or theft of services. A substantiated case of academic dishonesty may result in disciplinary action including a '0' on the assignment, a failing grade in the course, or expulsion from the College.

LABORATORY GRADES (190 points)

Deductions — Deductions from your lab grade may result from failure to use safe laboratory practices. These will include failure to dispose of materials in a correct and timely manner, failure to adequately label cultures (name, organism & date), and failure to wear lab coat. An unexcused absence from lab will be a 20 point deduction.

Results of Exercises (90 points) — You will be required to turn in the lab results on the pages provided at the end of each lab exercise. One copy of the results will be turned in for each lab group, at the beginning of the next lab period (usually). These will be graded as $\sqrt{+}$ (up to 10 pts), $\sqrt{}$ (up to 8 pts), or $\sqrt{-}$ (up to 5 pts) considering neatness, completeness, accuracy, proper interpretation, and apparent effort. A $\sqrt{+}$ will be awarded only for work that shows above average effort and thought. Partial or no credit will be given for late assignments, at the instructor's discretion.

Extra credit questions — For the labs marked with a “§”, you can receive up to 6 bonus points (i.e., up to 30 points for the semester) for turning in typed, well thought-out answers to the questions at the end of each lab exercise. Both students are expected to contribute to the answering of these questions – if only one student answers the questions then only one name should appear at the top. Plagiarism will be treated as for any written assignment (see section on academic dishonesty).

Microorganism practical (20 points) — You will be asked to identify types of eukaryotic microorganisms and some of their characteristics while viewing projection slides.

Gram Stain Practical (20 points) — Using a slant culture containing an unknown bacterium, you will prepare a Gram stain to identify the Gram reaction, and the shape and arrangement of the cells. You will also be graded on the quality of the smear and staining.

Identification of Unknowns Lab exercise (30 points) — You will be asked to identify 3 unknown bacteria to the level of genus using techniques and skills learned previously during the semester. Each student will work independently as a demonstration of the skills you have acquired during the semester.

Semester Unknown (30 points) — Each group will isolate, characterize, tentatively identify a bacterial unknown. The unknown will be isolated during the Basic Bacteriologic Techniques exercise and maintained throughout the semester in pure form. At the end of the semester each student will turn in a streak plate of the unknown demonstrating its colonial properties and purity; each group will turn in a summary of the properties that you determined during the semester, and a tentative identification.

Microorganisms that you should become familiar with during this semester. Given the name you should be able to identify relevant topics, and vice versa.

Protozoa

<i>Amoeba</i>	– general form
<i>Giardia</i>	– water pathogen
<i>Paramecium</i>	– ciliate
<i>Plasmodium</i>	– malaria
<i>Anopheles</i>	– vector of <i>Plasmodium</i>
<i>Trypanosoma</i>	– African Sleeping Sickness
TseTse	– vector of <i>Trypanosoma</i>

Topic

Fungi

<i>Candida</i>	– AIDS-related infection
<i>Claviceps</i>	– ergot
<i>Penicillium notatum</i>	– source of antibiotic
<i>Penicillium roquefortii</i>	– cheese
<i>Phytophthora</i>	– Irish potato blight
<i>Pneumocystis</i>	– AIDS-related pneumonia
<i>Saccharomyces</i>	– brewing and baking

Bacteria

<i>Bacillus</i> , spp	– source of antibiotic, etc.
<i>Bacillus anthracis</i>	– anthrax
<i>Borrelia</i>	– Lyme disease, spirochete
<i>Ixodes</i>	– vector of <i>Borrelia</i>
<i>Campylobacter</i>	– food contaminant
<i>Chlamydia</i>	– chlamydia
<i>Clostridium botulinum</i>	– botulism
<i>C. tetani</i>	– tetanus
<i>C. perfringens</i>	– food contaminant
<i>Escherichia coli</i>	– model Gram-neg, etc.
<i>Helicobacter pylori</i>	– peptic ulcers
<i>Lactobacillus</i>	– cheese making
<i>Mycobacterium tuberculosis</i>	– tuberculosis
<i>Mycoplasma</i>	– general form
<i>Neisseria gonorrhoeae</i>	– gonorrhea
<i>Oscillatoria</i>	– cyanobacterium
<i>Pseudomonas</i>	– enteric pathogen
<i>Rhizobium</i>	– legume endosymbiont
<i>Salmonella</i>	– food contaminant, Ames test
<i>Staphylococcus aureus</i>	– toxic shock syndrome, food contaminant, etc.
<i>Streptococcus pyogenes</i>	– strep throat, etc.
<i>Streptomyces</i>	– source of antibiotic
<i>Thiobacillus ferrooxidans</i>	– chemoautotroph
<i>Treponema pallidum</i>	– syphilis, spirochete
<i>Vibrio cholerae</i>	– cholera

Viruses

ebola	– really nasty
Herpes simplex I and II	– STD, etc
HIV	– AIDS
papillomavirus	– STD
tobacco mosaic virus	– plant virus
T2	– bacteriophage

Other ‘pathogens’

potato spindle tuber ‘virus’	– viroid
prion	– mad cow disease, etc

Important historic persons

Paul Ehrlich	– chemotherapeutics, etc
Alexander Fleming	– penicillin
Edward Jenner	– vaccination
Robert Hooke	– microscopy
Robert Koch	– germ theory, etc
Louis Pasteur	– germ theory, etc
Francis Redi	– spontaneous generation debate
Lazzaro Spallanzani	– spontaneous generation debate
Wendell Stanley	– viruses
Antoni van Leeuwenhoek	– microscopy