

Biology 414/5414
General Microbiology
Spring 2012

Credit: 4 semester hours

Prerequisites: BIO 111 – 112 and CHE 141 – 142 or Graduate Standing

Catalog Course Description:

A study of the natural history of bacteria, fungi, and viruses. Laboratory emphasis is given to the isolation of bacteria and fungi from both the biological and physical environment and their subsequent identification and metabolic characterization. Student receiving credit for BIO 414 cannot receive credit for BIO 251.

Instructor: Theodore E. Snazelle, Ph.D.

Office - 109 Hederman Science Building (see posted office hours or webpage)

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925-3339 (office – voice mail after five rings)

E-mail: snazelle@mc.edu

Homepage: <http://www.mc.edu/faculty/snazelle>

***Office Hours:** MF, 9:00 – 10:50 a.m.

M, 2:40 – 4:30 p.m.

TR, 10:00 a.m. – 12:10 p.m.

*other hours by appointment

Lecture Schedule: TR, 1:30 – 2:45 p.m., Self 210

Laboratory Schedule:

Lab 1 – TR, 3:00 – 4:30 p.m., H208

Learning Objectives:

1. The student will list and explain the great events in the history of microbiology, e.g. Leeuwenhoek's Animalcules, Germ Theory of Disease, Koch's Postulates, etc.
2. The student will summarize the structure and organization of bacteria and viruses.
3. The student will compare and contrast the techniques for culture and preservation of bacteria.
4. The student will summarize the culture of bacterial viruses.
5. The student will describe and explain sterilization, disinfection, and antisepsis.
6. The student will explain the bacterial growth curve and demonstrate the mathematics of bacterial growth through mathematical computations.
7. The student will list the types of antibiotics and explain their modes of action.
8. The student will explain bacterial antibiotic resistance.

Learning Objectives (cont.):

9. The student will summarize bacterial metabolism: glycolysis, respiration, and fermentation.
10. The student will list areas of the human body and their microbial flora.
11. The student will explain dental caries and other types of dental diseases and name the bacteria involved.
12. The student will summarize and explain pathogenicity virulence factors - invasiveness and toxigenicity.
13. The student will summarize selected bacteria and viruses and the diseases they cause in man.
14. The student will demonstrate the isolation, characterization, and identification of Gram positive cocci isolated from environmental surfaces, OR the student will demonstrate the isolation, characterization, and identification of Gram negative rods isolated from fresh surface water samples or soil samples.

Instructional Materials:All students:

Willey, Joanne M.; Sherwood, Linda M.; and Christopher J. Woolverton. 2011. *Prescott's, Microbiology*, 8th edition. McGraw Hill.

Snazelle, Theodore E. 2011 - 2012. *General Microbiology Lecture Guide and Laboratory Manual*. (Available for purchase in the Biology Office, H104, for \$10.00).

Graduate students:

Gaynes, Robert P. 2011. *Germ Theory: Medical Pioneers of Infectious Diseases*. ASM Press.

Lecture Topics:

- An Introduction to Microbiology
- Prokaryotic Cell Structure and Function
- Microbial Nutrition
- Microbial Growth
- Microbial Metabolism
- Antimicrobial Drugs for Bacteria
- Normal Microbial Flora
- Dental Infections
- Pathogenicity
- Bacteria: Gram-Negative Rods – Enterobacteriaceae
- Bacteria: Gram-Positive Cocci - *Staphylococcus* and *Streptococcus*
- Viruses
- Viral & Prion Diseases of Man

Laboratory Topics:

- Smear Preparation and Gram Stain

Streak Plate for Isolation of Bacteria

Laboratory Topics (cont.):

Media: Selective, Differential, and Enriched

Enumerating *Escherichia coli* in a Colony – Spread Plate Technique

Correlation of Phenol Red Sugar Broth Tube and TSI Slant Tube Inoculation Results

IMViC

Colilert[®] - Presence/Absence of Coliform Bacteria and Media Differentiation

API 20E System - Identification of an Unknown Enteric, Gram-Negative Bacterium

Biolog GEN III Microstation System– Isolation and identification of Gram positive cocci from environmental surfaces, OR isolation and identification of Gram-positive and Gram-negative bacteria from environmental surfaces, OR isolation and identification of Gram-negative rods from fresh surface water or soil samples.

Anaerobic Culture of Bacteria

Antiseptics and Disinfectants

Antimicrobial Drug Susceptibility Testing – Modified Kirby-Bauer Technique

Bacteriophages – Titer Determination and Plaque Morphology

***Important Dates:**

Microbiology lecture and laboratory begins, Tuesday, January 10, 2012

Exam #1- Thursday, February 16, 2012

Spring Break – March 9 – 18, 2012 – Friday night through Sunday.

Exam #2 - Tuesday, March 20, 2012

Graduate Student PowerPoint Presentations Begin, Thursday, March 22, 2012

Last Day to Drop a Class, Friday, March 23, 2012

Exam #3 - Thursday, April 12, 2012

Research Paper/Research Report due – Thursday, April 19, 2012

Comprehensive Laboratory Exam – Tuesday, April 24, 2012

Exam #4 - Tuesday, May 1, 2012, 11:00 a.m. - 1:00 p.m.

****Except for Exam #4, all exam dates are tentative.***

Undergraduate Student Evaluation Methods and Grading Scale: Four 100 point unit lecture exams will be given. ***During the semester, eight ten point quizzes will be given.*** A total of two quiz scores will be dropped. A missed quiz is a dropped quiz. Lecture exams will be largely objective in format, e.g. multiple choice and true-false, as also will be the comprehensive laboratory examination. Some short discussion and/or listing type questions may be included on the exams as well. Quizzes will be largely short answer. Additionally, a research report (not a research paper) will be written by each student, e.g. the isolation and characterization of Gram positive cocci from environmental surfaces, the isolation and identification of Gram-negative rods from fresh surface water samples, etc. The research report is worth a maximum of 20 points.

The undergraduate grading scale is as follows:

90 - 100 A
80 - 89 B
70 - 79 C
60 - 69 D
0 - 59 F

Your final average for the course will be determined by dividing the total number of points you make on your four lecture exams, quizzes, comprehensive laboratory exam, and research report by the total points possible; then, this decimal fraction is multiplied by 100 to give your final average as a percentage. Your final letter grade will be determined by comparing your final average for the course with the preceding grading scale.

Graduate Student Evaluation Methods and Grading Scale: Four 100 point unit lecture exams will be given. *During the semester, eight ten point quizzes will be given.* A total of two quiz scores will be dropped. A missed quiz is a dropped quiz. Lecture exams will be largely objective in format, e.g. multiple choice and true-false, as also will be the 100 point comprehensive laboratory examination. Some short discussion and/or listing type questions may be included on the exams as well. Quizzes will be largely short answer. A research paper will be written by each graduate student, e.g. the isolation and characterization of Gram positive cocci from environmental surfaces, the isolation and identification of Gram-negative rods from fresh surface water samples, etc. The research paper is worth a maximum of 30 points. PowerPoint presentations by pairs of graduate students will be made on topics assigned from *Germ Theory: Medical Pioneers of Infectious Diseases*. The PowerPoint presentations are worth a total of 30 points.

The graduate student grading scale is as follows:

90 - 100 A
86 - 89 B+
80 - 85 B
76 - 79 C+
70 - 75 C
60 - 69 D
0 - 59 F

Your final average for the course will be determined by dividing the total number of points you make on your four lecture exams, quizzes, comprehensive laboratory exam, research paper, PowerPoint presentation by the total points possible; then, this decimal fraction is multiplied by 100 to give your final average as a percentage. Your final letter grade will be determined by comparing your final average for the course with the preceding grading scale.

Typically on the first three exams, you will find bonus questions, if answered correctly, can raise your exam score. However, if you want to argue over every missed question in order to possibly raise your exam score, you do so at the expense of any bonus points you may have earned. You can't have it both ways! Obviously, if there is an instructor error on a question, the question may be deleted and your exam score recalculated.

E-mail: Like Mississippi College, I will only make contact with you at your _____[@mc.edu](mailto:_____@mc.edu) address. Check your e-mail frequently.

Attendance: See the Mississippi College Undergraduate Catalog or the Mississippi College Graduate Catalog for the University's attendance policy, i.e. 8 absences (excused or unexcused) in a semester class meeting two times a week will result in the student receiving an "F" for the course.

Academic Honesty Statement: See the Mississippi College Undergraduate Catalog or the Mississippi College Graduate Catalog for what the University considers to be academically dishonest, the student's responsibility and consequences for academic dishonesty.

Regarding Disabilities: If you are a student who needs special accommodations due to learning, physical, physiological, or other disabilities, please contact Dr. Morgan Bryant, Director, Student Counseling Services. [In order for a student to receive disability accommodations under Section 504 of the Americans with Disabilities Act, he or she must schedule an individual meeting with the Director of Student Counseling Services immediately upon recognition of their disability (if their disability is known they must come in before the semester begins or make an appointment immediately upon receipt of their syllabi for the new semester). The student must bring with them written documentation from a medical physician and/or licensed clinician that verifies their disability. If the student has received prior accommodations, they must bring written documentation of those accommodations (example Individualized Education Plan from the school system). Documentation must be current (within 3 years). The student must meet with SCS face-to face and also attend two (2) additional follow up meetings (one mid semester before or after midterm examinations and the last one at the end of the semester). Please note that the student may also schedule additional meetings as needed for support through SCS as they work with their professor throughout the semester. Note: Students must come in each semester to complete their Individualized Accommodation Plan (example: MC student completes fall semester IAP plan and even if student is a continuing student for the spring semester they must come in again to complete their spring semester IAP plan). Student Counseling Services may be found in Alumni Hall Room #4 or may be contacted via email: mbryant@mc.edu or rward@mc.edu or by phone at [601-925-7791](tel:601-925-7791).

During the semester this course is taught, the professor reserves the right to make any changes in the syllabus deemed appropriate or necessary.

