BIO 215 Principles of Microbiology (Revision Date: Jan. 2015)

Course Coordinator: Professor D.N. Hilker

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609-570-3367
Office: MS 122

Credit Hours 3  Lecture Hours 3

Required Text:
1. BIO 215 Principles of Microbiology Course Manual, by Professor Diane N. Hilker, 3rd edition

Course Description:
The study of the morphology, taxonomy, physiology, transmission, and control of microbes, especially those which cause disease in humans. The process of infectious disease and defense mechanisms of disease will be covered. Introduction to basic fundamental principles of organic chemistry and biochemistry. This course is designed for funeral education students and is based on the most recent information in the American Board of Funeral Service Education Curriculum Guidelines.

Prerequisites: CHE 100 and BIO 103, BIO 104 or BIO 106

Attendance
Students are expected to attend class unless they are ill or have some other important reason for not attending. If unable to attend class, please inform the instructor. An attendance sheet will be circulated in lecture. Please print your name and only your name.

Mercer’s Academic Integrity Policy
Any student who: a) knowingly represents work of others as his/her own; b) uses or obtains unauthorized assistance in the execution of any academic work; or c.) gives fraudulent assistance to another student is guilty of cheating. Violators will be penalized in accordance with established college policies and procedures.
Grading

1. **Lecture Exams: 90%**
   
   There will be 6 lecture exams given throughout the semester in class. **All exams are cumulative and are counted equally.** There are no make-up exams and none of the grades obtained on the exams are dropped. All exams must be returned to the instructor after each exam or the recorded grade will be a zero for that exam.

   After taking a test, students will be allowed to review their test in class with the instructor. Exams after review must be returned to the instructor or the recorded grade will be a zero for that exam. The total number of points obtained on all 6 exams will be 600.

2. **Writing Assignment: 10%**
   
   All students are required to complete a writing assignment called “Microbes in the Media.” This report will consist of 10 short articles that have been collected throughout the semester from newspapers, magazines, journals or the internet on the field of microbiology.

   For each article, the student should write a ½ to 1 page essay either summarizing or, if appropriate, giving an opinion on the topic. The essays are to be typed, understandable, and grammatically correct. The final report must contain both the 10 articles and the 10 essays. This assignment will be worth 100 points. The due date of this assignment will be announced in class.

3. **Example on Calculating Grades**
   
   A student receives the following numerical grades on their 6 lecture exams: 90, 83, 85, 77, 81 and 88. A grade of a 90 was received on the writing assignment.

   a) Total of 6 exams: 504 points
      
      \[
      \frac{504 \times 90\%}{6} = 75.6 \text{ points}
      \]

   b) Writing Assignment: 90 points
      
      \[
      90 \times 10\% = 9 \text{ points}
      \]

   c) Total: 75.6 and 9 = 84.6 points = B grade
Course Grading:
NOTE: Minimum “C” grade in Funeral Service courses is 75

100-94  A
93-90   A-
89-87   B+
86-83   B
82-80   B-
79-78   C+
77-75   C
74-60   D
>60  F

Topics Covered in BIO 215

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*Pathology and Microbiology for Mortuary Science by D. Mullins

Examinations

Exams will be given in class. Exam #6 will be given during Final Exam week. The exact date and time will be announced by the instructor.

Exam #1  Units 1, 2, 3
Exam #2  Units 1 through 4 (emphasis on Unit 4)
Exam #3  Units 1 through 5 (emphasis on Unit 5)
Exam #4  Units 1 through 8 (emphasis on Units 6, 7, 8)
Exam #5  Units 1 through 10 (emphasis on Units 9, 10)
Exam #6  Units 1 through 11 (emphasis on Unit 11)
Library DVD’s/Videotapes

DVD’s/Videotapes that pertain to the lecture topics are available at the reference desk in the college library (West Windsor). Students may find them helpful in explaining and reinforcing material covered in class. They include the following dvd’s/videotapes and the units in class that they correspond to:

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<th>Unit #1:</th>
<th>Classification of Living Things: Monera, Protista, Fungi</th>
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<td>*The Domains of Life: Life’s Three Great Branches</td>
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<td>*HPV: Issues and Answers</td>
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<td>*The Age of Viruses</td>
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<td>*A World Without Polio</td>
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<td>The Microbiology of AIDS</td>
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<td>*AIDS: A Global Crisis</td>
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<td>Unit #9:</td>
<td>The Immune Response</td>
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<td>*The Immune System at Work</td>
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<td>Antibiotics: Growing Resistance</td>
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<td>Antibiotics: The Double Edge Sword</td>
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<td>Unit #11:</td>
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<td>Tuberculosis: The Forgotten Plague</td>
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<td>Deadly Meat: When a Hamburger Can Kill</td>
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<td>*Ebola: The Plague Fighters</td>
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<td>*Chlamydia: The Hidden Disease</td>
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<td>*Foodborne Illness</td>
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*Available on DVD
Course Objectives
Upon satisfactory completion of this course, students should be able to:

1. Compare and contrast the overall cell structures and characteristics of various types of microorganisms and understand their specialized metabolic processes. (GE Goals 1, 2, 3, 4; MCCC CS Goals A, B, D, F)
2. Describe the fundamentals of the infectious processes and defense mechanisms against disease. (GE Goals 1, 3, 4; MCCC CS Goals A, B, D, F)
3. Explain the methods of transmission of infectious diseases and describe the control procedures used in the mortuary field. (GE Goals 1, 3, 4; MCCC CS Goals A, B, D, F)
4. State selected facts of general chemistry as a basis for studying organic and biochemistry. (GE Goals 1, 2, 3, 4; MCCC CS Goals A, B, D, F)
5. Define organic chemistry and describe the characteristic features of carbohydrates, lipids, and proteins. (GE Goals 1, 3, 4; MCCC CS Goals A, B, D, F)
6. Give the essential characteristics of autolysis, hydrolysis, fermentation, and putrefaction in the area of the chemistry of decomposition. (GE Goals 1, 3, 4; MCCC CS Goals A, B, D, F)

Course-Specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals
Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills
Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.
UNITS OF STUDY

Topic 1: Introduction to Microbiology
The student will be able to:
1. Define microbiology and describe the subdivisions associated with field. (CG 1)
2. Differentiate between eukaryotic and prokaryotic cells. (CG 1)
3. Compare and contrast the five kingdom classification scheme. (CG 1)

Topic 2: Fungi and Protozoa
The student will be able to:
1. Compare and contrast bacteria, fungi and protozoa. (CG 1)
2. Explain how arthropod vectors are involved in the transmission of infectious diseases. (CG 1, 2, 3)
3. Describe various infectious diseases caused by fungi and protozoa that would be important to the mortuary field and the methods of transmission of these diseases. (CG 1, 2, 3)

Topic 3: Bacterial Anatomy
The student will be able to:
1. Have a general understanding of the size and shape of bacteria. (CG 1)
2. Explain the structure of a bacterial cell and their method of reproduction. (CG 1)
3. Understand the problems that endospore producing microbes cause the embalmer. (CG 1, 3)
4. Describe the methods of isolating and identifying bacteria. (CG 1)

Topic 4: Organic Chemistry
The student will be able to:
1. Understand the structure of an atom, various types of chemical bonding and chemical formulas. (CG 4)
2. Differentiate between organic and inorganic compounds. (CG 4, 5)
3. Describe the structure and characteristics of the various classes of organic compounds including hydrocarbons, alcohols, aldehydes, ketones, acids, esters, amines, and thiolalcohols. (CG 4, 5)
4. Describe the features, synthesis and use of formaldehyde and glutaraldehyde as it relates to the mortuary field. (CG 4, 5, 6)
5. Describe the decomposition products of proteins as it relates to the embalmer. (CG 5, 6)
**Topic 5: Biochemistry**
The student will be able to:
1. Understand carbohydrate chemistry and explain how carbohydrates are classified, synthesized, and degraded. (CG 4,5)
2. Understand lipid chemistry and explain how lipids are degraded and saponified to produce adipocere. (CG 4, 5, 6)
3. Understand protein chemistry and explain imbibition, coagulation and the difference between decay and putrefaction. (CG 4, 5, 6)
4. Describe important characteristics of enzymes and their involvement in autolysis. (CG 4, 5, 6)

**Topic 6: Bacterial Physiology and Growth**
The student will be able to:
1. Explain the physical and chemical requirements for bacterial growth. (CG 1)
2. Discuss the three types of symbiotic relationships between organisms. (CG 1)

**Topic 7: Rickettsia and Chlamydia**
The student will be able to:
1. Describe various infectious diseases caused by the genus *Rickettsia* that would be important in the mortuary field and the methods of transmission of these diseases. (CG 1, 2, 3)
2. Describe various infectious diseases caused by the genus *Chlamydia* that would be important in the mortuary field and the methods of transmission of these diseases. (CG 1, 2, 3)

**Topic 8: Virology**
The student will be able to:
1. Understand the general characteristics associated with viruses. (CG 1)
2. Explain the connection between viruses and cancer. (CG 1)
3. Describe various infectious diseases caused by viruses that would be important to an embalmer and the methods of transmission of these diseases. (CG 1, 2, 3)
4. Discuss prions and the diseases associated with these organisms. (CG 1, 2, 3)

**Topic 9: Infection and Disease**
The student will be able to:
1. Define terms that are associated with infectious diseases and the sources of these infections. (CG 2)
2. Identify the various methods by which pathogens are transmitted including direct and indirect methods, fomites and arthropod vectors. (CG 3)
3. Explain how microbes can enter the body, cause disease and leave the body. (CG 3)
4. Understand the human defense mechanisms available to combat disease. (CG 2, 3)
**Topic 10: Microbial Control**
The student will be able to:
1. Describe the various physical methods of controlling microbes. (CG 3)
2. Describe the various chemical methods of controlling microbes particularly those that are suitable for mortuary procedures. (CG 3)

**Topic 11: Bacterial Infections**
The student will be able to:
1. Describe various infectious diseases caused by bacteria that would be important to the mortuary field and the methods of transmission of these diseases. (CG 1, 2, 3)

**Student Records**
Students may keep track of their progress in this class by recording their results.

Lecture Exams:  
Exam #1: __________
Exam #2: __________
Exam #3: __________
Exam #4: __________
Exam #5: __________
Exam #6: __________

Writing Assignment: Grade _____________