PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

MICROBIOLOGY
BIO 2220

Class Hours: 2.0
Credit Hours: 3.0
Laboratory Hours: 4.0
Date Revised: Spring 01

Catalog Course Description:
An introductory course in microbiology dealing with bacteria, fungi, yeast and viruses to include discussions of cell structure, identification, taxonomy, metabolism, genetics, resistance, infection, disease, and immunity.

Entry Level Standards:
High school biology; students are expected to read and write at the college level. It is suggested that students take one of the following before microbiology: CHM 1010 or 1110, BIO 1010 or 2310.

Prerequisites:
None

Textbook(s) and Other Reference Materials Basic to the Course:

Required:

Recommended:

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture: Brief History of Microbiology; Microscope&lt;br&gt;Lab: Lab 1, 2</td>
</tr>
<tr>
<td>2</td>
<td>Lecture: Anatomy of Prokaryotic and Eukaryotic Cells&lt;br&gt;Lab: Lab 5-7, 8</td>
</tr>
<tr>
<td>3</td>
<td>Lecture: Anatomy; Microbial Metabolism; EXAM 1&lt;br&gt;Lab: Lab 9, 10</td>
</tr>
<tr>
<td>4</td>
<td>Lecture: Metabolism&lt;br&gt;Lab: Lab 11, 12</td>
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</tbody>
</table>
II. Course Objectives*

A. Acquire a working knowledge of basic staining and culturing techniques and concepts. I.5
B. Be familiar with prokaryotic and eukaryotic characteristics. I.5
C. Understand microbial metabolism and growth. I.5
D. Be able to classify microorganisms. I.5, III.1
E. Understand the epidemiology, pathogenicity and drug treatment of specified microbial organisms. I.5
F. Recognize microbes associated with individual body systems. I.5
G. Know the principles of immunology. I.5
H. Achieve familiarity with applied microbiology. I.5
I. Be able to read and apply critical thinking to topics in the field of microbiology. III.1, III.2, VI.1
J. Become familiar with resources available on recent research and current information in the library in the field of microbiology. I.5

*Roman numerals after course objectives reference goals of the university parallel program.

III. Instructional Processes*:

Students will:

1. Locate and evaluate related scientific information in the ERC and on the World Wide Web. Information Literacy Outcome, Technological Literacy Outcome

2. Use related equipment and tools for making biological measurements and observations. Technological Literacy Outcome

3. Use Intranet course list serve to share information pertaining to the course with classmates. Communication Outcome, Technological Literacy Outcome, Information Literacy Outcome

4. Collect data, generate graphs and tables of the collected data, summarize the data, draw conclusions from the data, and apply these conclusions to related situations. Numerical Literacy Outcome

5. Read and critique scientific writings. Communication Outcome, Personal Development Outcome

6. Develop a vocabulary that allows them to communicate more effectively with their health care providers as well as in preparing for health care professions. Transitional Strategies

7. Participate in laboratory exercises which develop teamwork, problem solving skills and data analysis. Problem Solving and Decision Making Outcome; Active Learning Strategies

8. Utilize skills and procedures developed in the laboratory to design an implement plan to identify unknown microorganisms. Personal Development Outcome, Problem Solving and Decision Making Outcome

*Strategies and outcomes listed after instructional processes reference Pellissippi State’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Identify microbes through the use of cultures and staining techniques. A

2. Describe procaryotic cell characteristics as they relate to organism identification. B

3. Describe microbe metabolism and growth and their controlling factors. C

4. Describe genetic operations within microbes. H

5. Explain the mechanisms of classifying microbes and viruses, bacteria, protists, fungi, and helminths. D

6. Explain epidemiology. E

7. Explain pathogenicity and its causes. E
8. Describe drug action and treatment for specified microbes. E
9. Know the specific microbes associated with the different body systems. F
10. Explain operation of the immune system. G
11. Learn to read and abstract articles pertaining to microbiology. I, J
12. Learn to research and synthesize in written form current information in microbiology. I, J

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 500 points

Five exams, each worth 75 points, will be given. The lowest of these exam grades will be dropped. These exams will be non-cumulative, although students are expected to retain basic information acquired in previous chapters. Exams will consist of a combination of multiple choice, matching, short answer and essay questions. In addition, there will be a final exam worth 100 points. The final exam will be an cumulative exam involving multiple choice and matching questions only. This exam will be conducted in the classroom at the scheduled final examination period.

B. Laboratory Expectations: 500 points

Participation in laboratory exercises is mandatory. Laboratory assignments constitute 500 points broken down as follows: laboratory data sheets (100 points), laboratory reports (30 points), bacterial species note cards (75 points), biochemical tests and techniques note cards (125 points), practical exams (100 points), unknown identification (30 points), and work sheets (20 points). The remaining 20 will be based on attitude, teamwork, technique, lab safety, effort and attendance. Students must come prepared to laboratory. Preparation includes, but is not limited to: reading exercises in advance, completing purpose statement of exercises in advance, completing bacterial and biochemical note cards, bringing lab manual, lab coat and safety glasses to lab. Students MUST wear a lab coat and safety glasses in lab at all times!! Students must supply their own laboratory coat and glasses. Short lab jackets are not acceptable. **Laboratory data sheets:** Data sheets for each laboratory will be submitted at the end of the laboratory period in which the assignment is completed. Each data sheet is worth 5 points; only the top 20 scores will be kept. The purpose for each lab must be completed in the student’s words BEFORE lab, and the data sheets will be evaluated on neatness, completeness, and accuracy. Illegible data sheets will not be given credit. NO late assignments will be accepted!

**Laboratory reports:** Three laboratory reports, covering multiple laboratory exercises or requiring analysis of class data, will be completed by students. Laboratory reports will be worth 10 points each and will include completion of the data sheets in the laboratory manual, as well as a purpose and conclusion submitted on a separate sheet of paper. The purpose and conclusion will be grammatically correct, double-spaced and typed. The purpose will answer the question "Why are we doing the exercise(s)?" and will be no longer than 30 words. The conclusion will answer "What does the data tell us beyond what it says?" and will be no longer than 300 words. Additional information will be provided by the laboratory instructor. Due dates will be announced by the laboratory instructor. **NO LATE REPORTS WILL BE ACCEPTED!**

**Bacterial Species Note Cards:** Some of the organisms used in the laboratory are pathogenic (disease-causing). Students need to be aware of the potential hazards of these organisms. For each microorganism used in lab, students must record pertinent information about the species on a note card (4 x
Information on the front of the card should include the following:
- Genus and species name - genus capitalized, both names underlined
- Gram reaction and morphology
- Normal habitat (where bacteria grow)
- Impact on humans (diseases caused, usefulness in food production or spoilage)

The back of the card will be used to record a summary of staining and biochemical test results obtained in the laboratory. These will be used when working to identify unknowns. These cards must be completed before the first laboratory in which the microbe is used, and data will updated throughout the semester.

**Biochemical Tests and Techniques Note Cards:** For each new procedure (stains, biochemical tests) introduced in lab, students will prepare a 4” x 6” note card containing the following information: purpose of test, procedure, how the test is read (What does a positive reaction look like? What does a negative reaction look like?), and an example of organisms that are positive and negative for the test.

**Practical Exams:** Laboratory practical exams will consist of a number of stations. Students will rotate from station to station, answering questions. Stations may contain slides, culture plates, equipment or data from previous labs. Each station will have one to three questions based on the materials present. Sample questions will be provided in lab before the first lab practical. In order to prepare adequately for the practical exams, students must maintain complete laboratory data sheets and note cards.

**Unknown Identification:** Students will receive a list of organisms at the beginning of the semester, as well as a list of all the identification procedures to be learned in the laboratory. At the conclusion of each procedure, students will record the data for each organism. During the final portion of the lab, students will receive a mixture of two organisms which must be isolated and identified. Students will design and utilize a flow chart of the techniques and tests to identify these organisms. The flow chart and a daily log, as well as a typed purpose and conclusion, will be submitted for evaluation.

**Work sheets:** Two worksheets will be assigned in the laboratory during the semester. These will be submitted to the laboratory instructor on the due date announced in lab. All other grading procedures will be discussed by the laboratory instructor when assignments are made.

**Missed labs:** Missed labs can not be made up. Students may use a lab partner's data or set-up but points will be taken off of each exercise for each day of the experiment that was missed. Laboratory practical exams must be taken on the date announced. There are ABSOLUTELY NO make-ups of these exams!

C. Field Work: 100 points

Library research and writing are an integral part of this course. Students will write short abstracts of current articles as well as a research paper on a disease caused by a microorganism. In addition, in class worksheets may be given in conjunction with viewing videos. The distribution of points among these assignments will be discussed by the lecture instructor.

**Abstracts:** Students will write abstracts of current articles (no more than three months old) pertaining to microbiological issues covered in the course, following guidelines discussed in class. Abstracts will be collected at the beginning of lecture on the assigned due dates. Students may submit only one abstract per week. The final date abstracts will be accepted will be announced by the lecture instructor on the first day of class. See the handout "Instructions for Abstract Assignments" for additional details on writing and grading of abstracts, as well as a sample abstract.

**Disease Paper:** Students will select one disease caused by a microorganism (virus, bacteria, fungus or helminth). Students will write a research paper of 1000-1300 words (5 pages), typewritten, double-spaced, including symptoms, tests for identification, and treatment. Students are expected to utilize a variety of references, including (minimally) two reference books (textbooks are acceptable), one journal article and one internet resource. Sources should be cited in the body of the paper and a bibliography should be
included at the end of the paper. Format for the paper will be discussed in greater detail in class. The due date of the paper will be announced the first day of lecture.

D. Other Evaluation Methods:

N/A

E. Grading Scale:

The final grade will be based on accumulation of points from both lecture and lab which will then be divided by the total possible number of points (1100).

The following grading scale will be used.

<table>
<thead>
<tr>
<th>Points</th>
<th>Percentage Range</th>
<th>Grade</th>
</tr>
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<tbody>
<tr>
<td>990 - 1100</td>
<td>90% - 100%</td>
<td>A</td>
</tr>
<tr>
<td>957 - 989</td>
<td>87% - 89%</td>
<td>B+</td>
</tr>
<tr>
<td>880 - 956</td>
<td>80% - 86%</td>
<td>B</td>
</tr>
<tr>
<td>847 - 879</td>
<td>77% - 79%</td>
<td>C+</td>
</tr>
<tr>
<td>770 - 846</td>
<td>70% - 79%</td>
<td>C</td>
</tr>
<tr>
<td>660 - 769</td>
<td>60% - 69%</td>
<td>D</td>
</tr>
<tr>
<td>below 660 points</td>
<td>below 59%</td>
<td>F</td>
</tr>
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VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. If a student is absent from class, it is the student's responsibility to make up the missed material prior to the next class period.

B. Academic Dishonesty:

Plagiarism is any form of using another person’s words or ideas without giving proper credit. Plagiarism includes, though is not limited to, the following:
- Copying sentences from a source without putting them in quotes and citing the source.
- Borrowing a sentence from another author and simply substituting a few synonyms or rearranging the order of the sentence.
- Copying from another student.
Plagiarism is a form of mental laziness and will not be tolerated. Any plagiarized assignments will receive an automatic 0 and may not be dropped or replaced by resubmitting the assignment.
Cheating will not be tolerated. Students who are caught cheating may be given a 0 for the assignment; second offenses will result in an automatic failure of the class.

C. Other Policies:

Late assignments will be docked 10% per day.