PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

MICROBIOLOGY
BIOL 2130 (formerly BIOL 2230)

Class Hours: 2.0             Credit Hours: 4.0
Laboratory Hours: 4.0        Revised: Spring 04

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. Three hours of lecture and four hours of lab per week.

Entry Level Standards:
High school biology; students are expected to read and write at the college level.

Prerequisites:
None; suggested prerequisite: CHM 1010 or 1110; or BIO 2010; or BIO 1110

Textbook(s) and Other Course Materials:
John Wiley and Sons.
Harley, John P. And Prescott, Lansing. M. 2002. Laboratory Exercises in Microbiology, 5th

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Lecture: Chapter 1, 3: History; Microscope</td>
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<td>2</td>
<td>Lecture: Chapter 3, 4: Microscope; Cell Structure</td>
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<td>3</td>
<td>Lecture: Chapter 6: Test 1 (chapters 1,3, 4); Requirements for Growth</td>
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<td>4</td>
<td>Lecture: Chapter 5: Metabolism</td>
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<td>5</td>
<td>Lecture: Chapter 5, 12: Metabolism; Controlling Growth</td>
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<td>6</td>
<td>Lecture: Chapter 12, 13: Controlling Growth; Antimicrobial Drugs</td>
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<td>7</td>
<td>Lecture: Chapter 7: (chapters 6, 5, 12, 13); Genetics</td>
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<td>8</td>
<td>Lecture: Chapter 7, 8: Recombinant DNA</td>
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<td>9</td>
<td>Lecture: Chapter 9: Taxonomy and Bacteria</td>
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<td>Lab: 39, 53</td>
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Lecture: Chapter 10: Test 3 (chapters 7-9); Viruses

Lecture: Chapter 10, 11: Viruses; Eukaryotic Microbes and Parasites

Lecture: Chapter 11: Eukaryotic Microbes and Parasites

Lecture: Chapter 14: Test 4 (chapter 10, 11); Host-Microbe Interactions

Lecture: Chapter 14, 15: Host-Microbe Interactions; Epidemiology

Lecture: Chapter 15: Epidemiology; current topics and review

Final

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, III.2

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. 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*

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*

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

Four exams, each worth 100 points, will be given. These exams will be noncumulative, 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. There will be no make up exams. If a student must miss an exam, the instructor should be notified prior to the exam, or as soon as possible thereafter. The lowest exam of these four exams may be replaced by doubling the final exam score.
In addition, there will be a final exam worth 100 points. The final exam will consist of multiple choice and matching questions only; approximately 70% of the exam will be cumulative and 30% will cover new material. This exam will be conducted in the classroom at the scheduled final exam time. The final exam is not optional!

B. Laboratory Expectations: 340 points

Participation in laboratory exercises is mandatory. Laboratory assignments constitute 340 points broken down as follows: laboratory notebook (160 points), practical exams (100 points), unknown identification (30 points), and work sheets (20 points). The remaining 30 points 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; 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 and short sleeved lab coats are not acceptable. No food, drink, shorts or open-toed shoes are allowed in lab.

Laboratory notebook: Students will maintain a loose leaf laboratory notebook. The notebook should minimally contain dated entries for each exercise, purpose of the exercise, changes in procedure from the laboratory manual, notes from the laboratory lecture, specific organism(s) used by the student, results and observations, and a conclusion. Many exercises occur on multiple days, so each day should be dated. The purpose and conclusion should be written in complete sentences. All microscope observations should include a sketch of a portion of the field of view, showing shape and arrangement of the organisms; magnification; name of organism or source of sample; type of stain; color of cells; and, if using a differential or special stain, the type of reaction or special structures. Growth on plates should include a description of the colonies, including color, morphology, odor (if present), and a sketch of a typical colony. Growth in tubes should be described, using standard terminology. Sketches may be used to supplement the description. When appropriate, data should be organized in tables. Results of all biochemical reactions should include the type of media used; length of incubation; reagents added after incubation; color of reaction; and interpretation of the reaction (is the test positive or negative). The conclusion should go beyond the results to explain what they mean. For instance, a positive Gram stain (result) indicates that the organism has a thick peptidoglycan layer in its cell wall containing teichoic acids. Note that most conclusions will be brief, only one or two sentences long. Topics to address in the conclusion may be found in the ‘Thoughts To Consider’ section of the handouts for each lab, which are posted on the course website at: http://pstcc15.pstcc.edu/mfhicks/biol2230/biol2230lab.html. The laboratory notebook must be maintained daily, and must be neat and organized. It will be collected for grading at least four times during the semester, though the instructor may collect the notebooks at any time and without prior warning.

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 or more questions based on the materials present. Sample questions will be provided in lab before the first lab practical, and study guides are posted on the course website. In order to prepare adequately for the practical exams, students must maintain complete laboratory notebooks.

Unknown Identification: 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 stains and biochemical 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. Additional
information concerning the unknowns is posted on the course website.

Worksheets: 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 deducted from each exercise for each day of the experiment that was missed. These will be prorated based on:

\[
\frac{\text{the number of days missed}}{\text{number of days lab was conducted}}.
\]

If you know in advance that you will need to miss a lab, please discuss this with your laboratory instructor. Laboratory practical exams must be taken on the date announced. There are ABSOLUTELY NO make-ups of these exams!

C. Field Work: 160 points

Library research and writing are an integral part of this course. Students will write short abstracts of current articles and complete a series of disease applications/case studies throughout the semester.

Abstracts: Students will write six 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. See the handout "Instructions for Abstract Assignments" for additional details on writing and grading of abstracts, as well as a sample abstract. Each abstract is worth 10 points.

Disease Applications/Case Studies: Students will be given five assignments totaling 100 points during the course of the semester. These assignments will involve reading material on the Internet pertaining to specific diseases and applying this information in answering specific questions. Due dates will be announced by the lecture instructor.

D. Other Evaluation Methods:

Bonus Opportunities - up to 20 points

Book Report: You may select to read one of the following books and write a two page, double spaced report about the book, including a paragraph of your reflections. It must have enough detail to show that you have read the book, but must be written in the style of an abstract. Maximum bonus points from this assignment: 20. These bonus points will hopefully broaden your horizons and help you to appreciate the world around you. Please remember that clear communication (proper grammar and spelling, etc.) is important in getting your views across! Due date for the assignment will be announced in class.

* indicates we have this book in the PSTCC library. [Most of the others are in the Knox County Libraries.]

*The Hot Zone
*The Coming Plague
*Yellow Fever, Black Goddess
Virus X
Virus Hunters of the CDC
Virus Hunter
*Deadly Feasts

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 (1000). Note that grades are based on
total points, not percentages!

The following grading scale will be used.
900-1000 points  90% - 100%  A
870-899 points  87% - 89%  B+
800-869 points  80% - 86%  B
770-799 points  77% - 79%  C+
700-769 points  70% - 79%  C
600-699 points  60% - 69%  D
below 600 points  59% and below  F

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: Late assignments will not be accepted.
Course Web site: The master syllabus, lecture outlines, learning objectives, and other useful information pertaining to the course will be posted at the web site:
http://pstcc15.pstcc.edu/mfhicks/index.html#Microbiology
Announcements will be made in class or lab if any additional information is posted. Please note that if several students attempt to access the web site at the same time, the web server may respond with a message that states the information is not accessible. This is similar to calling someone on the telephone and getting a busy signal. Try again later. If you cannot access the information after trying several times (different times, days, etc.), please e-mail mfhicks@pstcc.edu and describe the problem, including the days and times you attempted to access the material, as well as your web browser version.