SYLLABUS
BEGINNINGS IN MICROBIOLOGY
Biology 240 Summer Session, 2014

Lecture: Mon, Tues, Wed, Thursday, 8-9:50 AM Murie 103/105
Lab: Tues, Thursday 1-4:30 PM Murie 206

Instructor: Dr. Pam Wagaman
Email: pcwagaman@alaska.edu
Please contact to schedule an appointment

T.A. Sarah Elder
smelder@alaska.edu


Online Learning Center: TBA

Lab Manual: Beginnings in Microbiology Lab Manual. Martinson (Weekly activities available on BlackBoard; to be printed out and brought to each lab)

Other materials: Permanent black Sharpie marker for lab, old shirt or lab coat for lab, safety glasses

Course Description: Fundamentals of microbiology. Survey of the microbial world; interactions between microbes and host; microbial diseases of humans; the environmental and economic impact of microorganisms. Provides background in basic and applied microbiology with emphasis on the role microorganisms play in human health and life.

Course goals/objectives:

Goal: Students will understand the basics of microbiology, with an emphasis on microbial growth, control, and role in human disease.

Learning Objectives/Instructional methods:

• The student will be able to demonstrate knowledge of the requirements for microbial growth and control.
• The student will demonstrate basic skills in microbiological lab techniques (aseptic technique, microscopy, staining, identification, and control/assessment of microbial growth).
• The student will be able to recognize the basic roles of host and microbe in the disease process.
• The student will be able to research, read, and discuss topics of importance to public health and biotechnology found in everyday news media.
The student will gain an understanding of the concept of scientific discovery and understand the process of scientific research.

Instructional methods will include lecture, class discussion, lab exercises, written activities, and online learning tools.

Course outline:
Lecture and lab topics are coordinated so that the concepts introduced in lecture are reinforced through lab exercises. The lecture portion of the course is divided into four main sections:

1. **Introduction to microbiology and scientific discovery**
2. **The biology of bacteria:**
   a. Structure of bacterial cells
   b. Growth of bacteria
   c. Control of bacterial growth
3. **Bacterial genetics:**
   Basics of DNA replication, transcription (DNA→RNA), and translation (RNA→protein)
4. **Microorganisms and disease:**
   a. Basics of the immune response and immune disorders
   b. Host-microbe interactions
   c. Introduction to epidemiology
   d. Body systems and their diseases

Prerequisites:
One course in high school or college level biology OR permission of the instructor. Recommended: 1 course in chemistry.

Evaluation:
There are two parts to this course: lecture and lab, worth a total of 700 points. The lecture portion of the course accounts for 420 points (60%) and the lab portion accounts for 280 points (40%).

Breakdown of assignments:

**Lecture:**
- Infectious disease report 20 pts
- Weekly quizzes (4 @ 50 points each) 200 pts
- Final Exam 200 pts

**Lab:**
- Lab manual (varies with exercise) 100 pts
- Lab quizzes (2 @ 25 points each) 50 pts
- Clinical case studies 30 pts
- Lab practical 100 pts
Explanation of assignments:

**Infectious disease report:** Web links to articles from magazines or newspapers, as well as to a variety of resources, will be made available to students on BlackBoard. The student will select a topic to read and research, and write a short (500-1000 word) report on the article. Reports will contain the following elements, each worth 5 pts.

1. a brief statement of the problem with introductory material (for example, if the article is about strep infections, describe *Streptococcus* and tell a little about the type of infection discussed in your article)
2. a statement of what research was done to solve a problem or answer a question, or discussion presented in the paper you selected. Make it brief—use bullet points.
3. Your own thoughts on the article (such as why this article is of importance, what you think should be done next, how they demonstrated the scientific method, OR what you wish the authors had addressed)
4. resources. (Author, Year or Date, Title, Source, pages if applicable)

Examples of resource formats

**Online article:** Jeffrey Perkel. Jan. 24, 2008. Key Anthrax Virulence Factor Discovered. HONselect; www.hon.ch/News/HSN


**Clinical Case Studies:** This assignment will be accessible through BlackBoard. Use your text and any other resources you choose to answer the questions for each case study. You may choose to work in small groups on this assignment, but each student must submit answers for each study. Three studies will be included for 10 points each.

**Grades:**

Grades are given as follows:

- A 90% or higher
- B 80%-89%
- C 70%-79%
- D 60%-69%
- F <60%

Exams will not be graded on a curve. If you have concerns about your grades, please do not wait until the last week to come to me for help—I may be able to offer suggestions for study. The opportunity for lively discussion will be available on a regular basis and is highly encouraged. Not only will these discussions help clarify concepts, but they will give you an opportunity to practice discussing science with each other. This is particularly important if you are entering a health-related field. Remember that the objective of this course is for you to learn enough basic microbiology to read news articles, listen intelligently to the media, carry on a conversation, and understand basic concepts of microbiology!
This syllabus, with the lecture and lab calendars, will help guide the course and give you reading assignments, dates for exams, and deadlines for written assignments. Make a copy to keep with your class materials and refer to them frequently. NOTE: Because of the tight summer session schedule, I expect students to be present for exams. Makeup exams will be scheduled only at my discretion and under extenuating circumstances!

Lab:
Lab exercises are an integral part of this course and intended to reinforce the biological principles introduced in lecture. In general, missed labs cannot be made up due to the extensive amount of work that goes into preparing for the lab. If you must miss a lab, please let myself and/or your T.A. know as soon as possible so that we can attempt to accommodate you. Keep in mind that many of the exercises are completed over the course of two or more lab periods. Completion of the lab exercises (recording results and observations), as well as developing good lab techniques, are critical to successful completion of this course. Please come to lab prepared (print out and review the lab exercises beforehand), and be on time.

You are responsible for completing all parts of the exercises we cover in this class. This includes recording results and observations, and answering brief questions about your results. Since each lab exercise is different, the number of points varies for each exercise. Basically, if you do all the exercises, record your results, and provide thoughtful answers to all questions, you will receive full credit. Failure to completely answer questions will result in partial credit being given.

Your proficiency in and understanding of general microbiological techniques will be assessed during the lab practical, given at the end of the semester. It is very important to thoroughly understand the concepts covered in lab, as well as to be proficient in standard methods such as pure culture techniques, Gram staining, and microscopy. Therefore, as you go through the lab exercise, take your time and make sure you understand the principles behind what you are doing. You will have plenty of opportunities to practice your techniques, as well. Don’t be afraid to ask questions! It is the best way to understand both the laboratory exercises and the supporting concepts learned in lecture.

Attendance:
I strongly recommend that you attend all lectures. Due to the shortened timeframe of the summer session, you will miss a lot of material and discussion if you miss even one class. I generally do not take attendance in lecture, but will note absences in lab. PLEASE NOTE: Missing two labs is equivalent to dropping the lab portion of the class, and a grade of F will be given.
Lecture slides and exams:
PowerPoint presentations used for lecture will be coordinated with the text and posted on BlackBoard. Due to the compressed schedule for this session, it is very important that you keep up with the calendar of topics and study! McGraw-Hill provides excellent study tools at the end of each chapter, as well as online quizzes and interactive learning tools. Lectures are intended to provide a forum for clarification and discussion of the text material. Unless I tell you that a section of the text will NOT be covered on an exam, you should assume that both the text and lecture material are to be studied. If you need further clarification on lecture or text materials, please bring it up in class or make an appointment to talk with me.

Four weekly quizzes are scheduled to encourage you to keep up with your work and to identify concepts that need further explanation. The final exam will be cumulative, with about 50% coming from “old” material. A study guide for the final exam will be posted on BlackBoard and a review session will also be held.

Course Policies:
Food: Food and drink are strictly prohibited in lab. Please do not bring food into the lecture. Covered drinks may be brought into lecture.

Electronics: Electronic gadgets may not be used during lab (iPods, MP3 players, laptops or tablets, etc). You may use laptops or tablets in lecture for note-taking only. Use of cell phones will not be permitted in either lab or in lecture. Please turn them off and leave them stored. Messages may be returned during break or after class. Please do not text or play games during lectures. Earbuds may not be used during exams or during lectures.

Children or other persons not enrolled in the class are not permitted in the classroom or lab.

Disabilities Services:
The Office of Disability Services implements the Americans with Disabilities Act (ADA) and ensures that all UAF students have equal access to campus and course materials. I will work with the Office of Disabilities Services (Whitman Bldg., Room 203, 474-7043) to provide reasonable accommodation to students with documented disabilities.

Academic integrity:
It is assumed that the work you do for this course is your own, and not that of someone else. All aspects of the UAF Student Code of Conduct apply (see the UAF academic catalog). Plagiarism or cheating may be punished by failure on an exam and possible failure and/or expulsion from the course. In lab we will sometimes be working with partners or in teams, and it is expected that each partner will contribute equally to the exercise, so hold each other accountable!
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Text Pages (7th edition)</th>
<th>Assignment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 27</td>
<td>Introduction Microscopy</td>
<td>1-16</td>
<td></td>
</tr>
<tr>
<td>May 28</td>
<td>Chemistry and macromolecules</td>
<td>17-38</td>
<td></td>
</tr>
<tr>
<td>May 29</td>
<td>Structure of prokaryotic cells</td>
<td>50-80</td>
<td></td>
</tr>
<tr>
<td>June 2</td>
<td>Microbial growth</td>
<td>82-106</td>
<td>Quiz #1</td>
</tr>
<tr>
<td>June 3</td>
<td>Control of microbial growth</td>
<td>107-125</td>
<td></td>
</tr>
<tr>
<td>June 4</td>
<td>Metabolism</td>
<td>126-160</td>
<td></td>
</tr>
<tr>
<td>June 5</td>
<td>DNA, RNA, and Proteins</td>
<td>161-187</td>
<td>Lab Quiz #1</td>
</tr>
<tr>
<td>June 9</td>
<td>Bacterial genetics—Mutations and repair Viruses</td>
<td>188-214</td>
<td>Quiz #2</td>
</tr>
<tr>
<td>June 10</td>
<td>Innate and Adaptive Immune Response</td>
<td>334-379</td>
<td></td>
</tr>
<tr>
<td>June 11</td>
<td>Host-Microbe Interactions</td>
<td>380-400</td>
<td></td>
</tr>
<tr>
<td>June 12</td>
<td>Immunological Disorders Applications of Immune Responses</td>
<td>401-418</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>419-436</td>
<td></td>
</tr>
<tr>
<td>June 16</td>
<td>Epidemiology and Nosocomial Infections</td>
<td>437-456</td>
<td>Quiz #3</td>
</tr>
<tr>
<td>June 17</td>
<td>Antimicrobial Drugs</td>
<td>457-482</td>
<td></td>
</tr>
<tr>
<td>June 18</td>
<td>Respiratory System Infections</td>
<td>483-520</td>
<td></td>
</tr>
<tr>
<td>June 19</td>
<td>Skin Infections</td>
<td>521-547</td>
<td>Lab Quiz #2</td>
</tr>
<tr>
<td>June 23</td>
<td>Wound Infections</td>
<td>548-570</td>
<td>Quiz #4</td>
</tr>
<tr>
<td>June 24</td>
<td>Digestive System Infections</td>
<td>571-610</td>
<td></td>
</tr>
<tr>
<td>June 25</td>
<td>Nervous System Infections</td>
<td>641-669</td>
<td></td>
</tr>
<tr>
<td>June 26</td>
<td>Genitourinary Tract Infections HIV Disease</td>
<td>611-640 694-717</td>
<td>Deadline to post infection reports and case studies</td>
</tr>
<tr>
<td>June 30</td>
<td>Infections of Blood and Lymphatic System</td>
<td>670-693</td>
<td></td>
</tr>
<tr>
<td>July 1</td>
<td>Review</td>
<td></td>
<td>LAB PRACTICAL</td>
</tr>
<tr>
<td>July 2</td>
<td><strong>FINAL EXAM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Lab</td>
<td>Results</td>
<td>Assignment Due</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>May 27</td>
<td>Lab Safety, Microscopy, Aseptic Technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 29</td>
<td>Microbial Ubiquity, Pure Culture Technique, Staining</td>
<td>Aseptic Technique</td>
<td>Worksheet 1</td>
</tr>
<tr>
<td>June 3</td>
<td>Population Counts</td>
<td>Microbial Ubiquity, Pure Culture</td>
<td>Worksheet 2</td>
</tr>
<tr>
<td>June 5</td>
<td>Handwashing, DNA Simulation</td>
<td>Population Counts</td>
<td>Lab Quiz 1, Worksheet 3, Worksheet 4</td>
</tr>
<tr>
<td>June 10</td>
<td>Chemical Control Methods, UV Control</td>
<td>Handwashing</td>
<td>Worksheet 5</td>
</tr>
<tr>
<td>June 12</td>
<td>Antimicrobial Sensitivity, Bacteria of the Oral and Nasal Passages</td>
<td>Chemical Control, UV Control</td>
<td>Worksheet 6</td>
</tr>
<tr>
<td>June 17</td>
<td>Identification of Unknown Bacteria, Bacteria of GI Tract I</td>
<td>Antimicrobial Sensitivity, Oral and Nasal Passages</td>
<td>Worksheet 7</td>
</tr>
<tr>
<td>June 19</td>
<td>Bacteria of GI Tract II</td>
<td>Unknown Bacteria, GI Tract I</td>
<td>Lab Quiz 2, Worksheet 8</td>
</tr>
<tr>
<td>June 24</td>
<td>Bacteria of GI Tract III, Blood Typing</td>
<td></td>
<td>Worksheet 9</td>
</tr>
<tr>
<td>June 26</td>
<td>Bacteria of GI Tract IV, Lab Practical Review</td>
<td>Complete Bacteria of GI Tract</td>
<td>Worksheet 10</td>
</tr>
<tr>
<td>July 1</td>
<td>Lab Practical</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>