Cedar Crest College

Biology 127- Fundamentals of Microbiology

Spring Session  2010

Instructor Information:

- Instructor: Dr. Eileen Epsaro
- Phone: (610) 419-0600
- E-mail: eepsaro@cedarcrest.edu
- Additionally, between 9:00 AM and 4:00 PM messages can be left with the department secretary at (610) 606-4611.

General Course Information:

- Course Title: BIO-127- Fundamentals of Microbiology 1 credit
- Course Description:
  o The general characteristics of bacteria, protozoa, yeasts, molds and viruses will be used to understand the role of microorganisms in human health and disease. The interactions between the host and microorganisms will be emphasized as well as physical and chemical methods of control.
- Textbooks:
  o Laboratory: Epsaro, Eileen; BIO-127 Lab Manual, 2010
- Format:
  o Laboratory: 3.0 hours per week
- Attendance:
  o Attendance is mandatory. In the event of a personal or family emergency, you must contact the office of the Dean of Student Affairs (Denise O’Neil: 610 606-4666, x4680) to obtain appropriate documentation for an excused absence. These offices will contact me. You should also contact me to discuss when you will make up the work that was missed.
  o You MUST come prepared for labs. (It is extremely important to read through the lab manual for each lab prior to coming into the lab).
# Laboratory Syllabus

<table>
<thead>
<tr>
<th>Date</th>
<th>Lab Exercise</th>
<th>Page</th>
<th>Lab Exercise</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Jan 19/21</td>
<td><strong>Introduction to Lab:</strong> Safety</td>
<td>3</td>
<td>Review Aseptic Technique</td>
<td>14</td>
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<tr>
<td></td>
<td>Ex. 1 Microscopy</td>
<td>4</td>
<td>Ex. 3 Smear Preparation</td>
<td>17</td>
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<tr>
<td></td>
<td>Focus in oil with prepared slides</td>
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<td>Ex. 4 Direct Stain</td>
<td>19</td>
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<td></td>
<td>Ex. 2 Wet Mount Technique</td>
<td>11</td>
<td>Ex. 5 Negative Stain</td>
<td>22</td>
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<td></td>
<td>Examine Living Organisms</td>
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</table>

| Jan 26/28 | QUIZ 1 (Ex. 1-5)                                  |      | Ex. 7 Acid-Fast Stain                             | 31   |
|           | Ex. 6 Gram Stain                                  | 25   |                                                   |      |
|           | Examine prepared slides of **Mycobacterium tuberculosis** |      |                                                   |      |

| Feb 2/4   | Structural Stains                                 |      | Ex. 11 Culture Media                              | 51   |
|           | Ex. 8 Endospore Stain                             | 37   | Prepare Media:                                    |      |
|           | Ex. 9 Capsule Stain                               | 42   | Review Math Calculations                          |      |
|           | Examine prepared slides                           |      | Review Pi petting                                 |      |
|           | Ex. 10 Flagella Stain                             | 44   |                                                   |      |
|           | Examine prepared slides                           |      |                                                   |      |

| Feb 9/11  | QUIZ 2 (Ex. 6-10)                                 |      | Ex. 12 Complete                                   | 73   |
|           | Ex. 12 Microbes in the Environment                | 54   | Ex. 13 Complete                                   |      |
|           | Ex. 13 Isolation of Bacteria                      | 62   | Ex. 14 Transfer of Bacteria                       |      |
|           |                                                   |      | Introduce ‘UNKNOWN’ bacteria                      |      |

| Feb 16/18 | Ex. 14 Complete                                    |      | Ex. 15-17 Complete                                 |      |
|           | - Characterization of ‘UNKNOWN’                   |      | Ex. 18 Methyl Red Test                             | 96   |
|           | - Gram Stain ‘UNKNOWN’                            |      | Ex. 19 Citrate Test                                | 101  |
|           | Ex. 15 Starch Hydrolysis Test                     | 80   | Ex. 20 Lipid Hydrolysis Test                       | 107  |
|           | Ex. 16 Oxidative-Fermentative Test                | 85   | Ex. 21 Catalase Test                               | 113  |
|           | Ex. 17 Carbohydrate Fermentation Tests            |      |                                                   |      |
|           | - Glucose and Lactose                             | 91   |                                                   |      |
Feb 23/25  **QUIZ 3 (Ex. 11-17)**
- Ex. 18-20 Complete
- Ex. 22 Nitrate Reduction Test 118
- Ex. 23 Oxidase Test 123
- Ex. 24 Oxygen Requirement Test 127
- Ex. 25 Anaerobic Jar 132

**Ex. 22-25 Complete**
- Ex. 26 Gelatin Hydrolysis Test 139
- Ex. 27 Urea Test 144
- Ex. 28 SIM Test 149
- Ex. 29 Litmus Milk Test 156
- Ex. 30 Motility Test 162

Mar 2/4  **QUIZ 4 (Ex. 18-23)**
- Ex. 26-30 Complete
- Review for Practical 1
- Review Food Lab

**PRACTICAL 1**
(ALL information Ex. 1 - Ex. 23)

Mar 9/11  **NO CLASS**
(Spring Break)

Mar 16/18  **NO CLASS**
(Spring Break)

Mar 16/18  **Bring Food Samples to Lab**
- Ex. 31 Microbes in Food 168
- (Student designs an experiment to test the bacterial count in a food sample)
- Ex. 32 Writing a Scientific Abstract 177

**QUIZ 5 (Ex. 24-30)**
- Ex. 33 Skin Culture 182
- Inoculate a Mannitol Salt Agar plate
- Ex. 34 Respiratory (Throat) Culture 191
- Inoculate a 5% Sheep Blood Agar plate

Mar 23/25  **Ex. 34 Respiratory Culture (con’d) 191**
- Choose 3 different colonies and Record:
  - Type of Hemolysis
  - Gram Stain result
  - Catalase test result

'UNKNOWN' REPORT DUE

Mar 30/Apr 1  **Ex. 33 Skin Culture (con’d) 182**
- Set up additional Tests:
  - Sugar Fermentation Tests
  - Coagulase Test
- Ex. 35 Mouth Culture (con’d) 199
- Complete

**QUIZ 6 (Ex. 31, 34, 35)**
- Ex. 33 Skin Culture (con’d) 182
- Complete
- Ex. 36 Urine Culture 208
- Set up microscopic evaluation, 5% Sheep Blood Agar plate and MacConkey Agar plate

*Take Nutrient Broth/Swab for Ex. 37 (4/8)*
Apr 6/8  NO CLASS  (Monday Schedule)
Ex. 37 Intestinal Culture  215
   - Set up Bile Esulin Hydrolysis Test
   - Set up MacConkey Agar Plate
Ex. 36 Urine Culture  208
   - Complete

Apr 13/15 Ex. 37 Intestinal Culture (con’d)  215
   - Complete Bile Esulin Hydrolysis Test
   - MacConkey Agar plate:
     - Gram Stain 1 LF colony
     - Streak a LF/Gram (-) rod to a
       2nd MacConkey Agar plate and
       a Nutrient Agar slant
Ex. 38 Antimicrobials Drug/ Antibiotics  222
   * Use Intestinal ‘Unknown’

QUIZ 7 (Ex. 33, 36, 37)
Ex. 37 Intestinal Culture  215
   - Set up Urea Test, Citrate Test,
     SIM Test, And an EMB Agar plate
Ex. 38 Antimicrobials Drug/ Antibiotics  222

ABSTRACT DUE

Apr 20/22 Ex. 39 Antiseptics/Disinfectants  231
Ex. 40 Effectiveness of Alcohol  235
Ex. 41 Effectiveness of Handwashing  238
Ex. 42 Fungi: Molds and Yeasts  240

Apr 27/29 QUIZ 8 (Ex. 38, 39, 40, 41, 42)  PRACTICAL 2
Ex. 43 Protozoa and Helminths  246
   (All information from Ex. 24-44)
Ex. 44 White Blood Cells  252

- Students are required to wear a lab coat, to be well-prepared for all classes,
to work efficiently and neatly during lab sessions, to exhibit a hard-working,
cooperative attitude and to observe all lab safety rules. Points will be
deducted from the student’s final lab grade if these requirements are not met.
Course Assessment

The laboratory course will be worth a total of 460 points. The number of points the student earns divided by 460 will be the final grade. An outline of the grading for the lab is as follows:

- **Quizzes:**
  - Eight quizzes will be given in lab. Quiz 1, 2, 6, 7, and 8 will be worth a total of 20 points each. Quiz 3, 4, and 5 will be worth 25 points each. The total number of points which can be earned toward the final lab grade is 175 points.

- **Practical exams:**
  - Two practical exams will be given to assess the student’s ability to properly interpret bacteriological tests. Each practical will be worth 75 points, for a total of 150 points toward the lab grade.

- **Unknown Report:**
  - Each student will submit a report on a particular bacteria that they have identified. This is called an “Unknown Report”. It will include all of the laboratory tests performed, the results of these tests and a instructor will assess the student’s laboratory techniques while this work is being performed. This Unknown Report is worth a total of 50 points toward the lab grade.

- **Abstract:**
  - Each student will design and perform an experiment analyzing the bacterial count in a food sample. An abstract will be written which outlines the experimentation and the results obtained. This abstract will be worth a total of 30 points toward the lab grade.

- **Body Site Cultures:**
  - Each student will do a skin culture, throat culture, mouth culture, urine culture and an intestinal culture. Each of these reports will be worth a total of 10 points, for a total of 50 points toward the lab grade.

- **Lab Technique:**
  - Each student will receive points for various aspects of laboratory technique, including results obtained for each staining procedure, microscopy skills, and laboratory work ethic. The combined points for laboratory technique is 20 points.
# Summary of Grading and Student’s Record of Grades

## LAB

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<tr>
<th></th>
<th>Total Points</th>
<th>Student’s Score</th>
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<tr>
<td>Quiz 1</td>
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<td>Laboratory Technique:</td>
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<tr>
<td>Microscopy skills</td>
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<tr>
<td>Work ethic and safety</td>
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<tr>
<td><strong>Total Points for Lab</strong></td>
<td><strong>475</strong></td>
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* (Student’s Total Points/475) = Final Grade for the Lab Course
Course Regulations

1. **Attendance is mandatory**
   - For each lab missed, **2 points** will be deducted from the final lab grade.
   - A **doctor’s excuse** or an **official excuse from the dean’s office** will be permitted so as not to have any points deducted from lab.
   - If the student must miss a lab, it is the responsibility of the student to make up all work that was missed before the next scheduled lab.

2. **Lab Exercises**
   - It is the student’s responsibility to complete **all** scheduled labs for the course or an ‘Incomplete’ may be given for the final grade.

3. **Testing**
   - If a student **misses a quiz or an exam** in lab, **an excuse from the dean’s office** is required, and the exam or quiz must be made up **within 24 hours** or a “0” will be given for the grade.
   - **No** books, notebooks or papers will be permitted on desks or lab tables during quizzes or exams.
   - **Cheating** will result in a failure of the course.
   - The **Honor Philosophy** should be followed in all work, quizzes, and practical exams.
     See student code book.

4. **Lab Preparation**
   - The student **must come prepared for lab** and **must read all lab material for the lab** prior to coming to class.

5. **Classroom Etiquette**
   - Students are expected to arrive promptly for each class session. Late arrivals or early departures will not be tolerated.
   - Students are expected to be respectful in class. Unnecessary talking will not be permitted.
   - Students are required to have a cooperative attitude and a willingness to learn.
   
   *I will deduct up to 10% from the student’s final grade if these requirements are not met.*

6. **Safety** procedures will be strictly enforced in the lab.
   - **Students must read and initial the safety sheet on page 3 of the lab manual.**
   - Students are expected to **clean their table top** with disinfectant and to **wash their hands** before and after class.
   - A **lab coat** must be worn in lab.
   - **No** eating or drinking or smoking will be permitted in the lab.
- Long hair must be tied up in order to avoid injury from the Bunsen burners and cultures.
- Place all old cultures, plates, etc., in designated areas to be autoclaved.
- Whenever a spill occurs, notify the instructor so that proper disinfection procedures can be followed.
- It is the responsibility of everyone to see that all materials are put away at the end of each lab session and the work bench stools are pushed under the lab table.

*Proper laboratory technique, being prepared for class and observations of the lab safety rules are required. Points will be deducted if these requirements are not met.

**Course Objectives**

At the completion of this course the student should be able to:

1. Describe the general characteristics of bacteria, protozoa, yeasts, molds and viruses.
2. Understand the roles that microorganisms have in the scheme of life, and that they are ubiquitous.
3. Explain the role that microorganisms have in maintaining human health and causing disease.
4. Understand the importance of food preservation and proper food handling in the prevention of food-borne diseases.
5. Describe the chemical and physical methods that are used to control microorganisms.
6. Describe the mechanism of action of some antibiotics/chemotherapeutic agents.
7. Explain the function of the immune system.
8. Describe the non-specific and specific immune response.
9. Explain the role of antiserum and vaccines.
10. List some of the normal flora organisms.
11. Discuss the pathogens that enter the body by various portals.
12. Cultivate bacteria and understand their nutritional and physical requirements.
13. Perform various staining techniques.
14. Perform laboratory techniques aseptically.
15. Perform bacterial dilutions and plate counts.
16. Recognize bacterial types, protozoans, and fungi microscopically.
17. Prepare bacteriological media.
18. Isolate and identify a normal flora organism from the skin, GI tract, and the throat.
Course Outcomes

1. The student will learn the principles of Microbiology that are necessary for careers in nursing and nutrition.
2. Students will demonstrate critical thinking and reasoning skills when they isolate and identify unknown bacteria from the skin and gastrointestinal tracts.
3. Students will be able to function in a clinical setting that requires aseptic techniques. This will allow them to protect themselves and their patients from infectious agents.
4. Students should be able to prevent microbial food contamination in a food preparation setting.

Policies/Procedures

The following have been taken from the Student Custom Book

Honor Philosophy

The Cedar Crest College Honor Philosophy states that students should uphold community standards for academic and social behavior in order to preserve a learning environment dedicated to personal and academic excellence. Upholding community standards is a matter of personal integrity and honor. Individuals who accept the honor of membership in the Cedar Crest College community of scholars pledge to accept responsibility for their actions in all academic and social situations and for the effect their actions may have on other members of the College community.

Academic Integrity

Academic integrity and ethics remain steadfast, withstanding technological change. Cedar Crest College academic standards therefore apply to all academic work, including, but not limited to, handwritten or computer-generated documents, video or audio recordings, and telecommunications.

As a student at Cedar Crest College, each student shall:

- Only submit work which is his/her own
- Adhere to the rules of acknowledging outside sources, as defined by the instructor, never plagiarizing or misrepresenting intellectual property.
- Neither seek nor receive aid from another student, converse with one another when inappropriate, nor use material not authorized by the instructor.
- Follow the instructions of the professor in any academic situation or environment, including taking exams, laboratory procedures, the preparation of papers, properly and respectfully using College facilities and resources, including library and computing resources to ensure that these resources may be shared by all members of the College community.
- Abide by the Cedar Crest College Computer Use Policy.
- If a student perceives a violation of the Academic Standards, he/she will go to the instructor.
- If you are unable to resolve the problem with the instructor, you should go to the chair of the department. If you need further assistance after consultation with the instructor and the chair, you should see the Provost.

**Classroom Protocol**

Appropriate classroom behavior is defined and guided by complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations and any other behaviors that might disrupt instruction and/or compromise students’ access to the Cedar Crest College education.

Students are expected to have prompt and regular classroom attendance in accordance with the policy stated on the syllabus.

**Learning Disabilities/Statement of College Policy**

Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first 2 weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center.

I fully support the Cedar Crest College Honor Code and Classroom Protocol Code.

Plagiarism will result in an “F” for the assignment and will be reported to the Vice President for Academic Affairs and the Dean of Faculty.