

Cedar Crest College

Biology 127- Fundamentals of Microbiology

Spring Session 2010

Instructor Information:

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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

<u>Date</u>	<u>Lab Exercise</u>	<u>Page</u>	<u>Lab Exercise</u>	<u>Page</u>
Jan 19/21	<u>Introduction to Lab:</u>			
	Safety	3	Review Aseptic Technique	14
	Ex. 1 Microscopy	4	Ex. 3 Smear Preparation	17
	Focus in oil with prepared slides		Ex. 4 Direct Stain	19
	Ex. 2 Wet Mount Technique	11	Ex. 5 Negative Stain	22
	Examine Living Organisms			
Jan 26/28	QUIZ 1 (Ex. 1-5)		Ex. 7 Acid-Fast Stain	31
	Ex. 6 Gram Stain	25	<u>Examine prepared slides of Mycobacterium tuberculosis</u>	
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	
Feb 9/11	Ex. 10 Flagella Stain	44		
	Examine prepared slides			
	QUIZ 2 (Ex. 6-10)		Ex. 12 Complete	
Ex. 12 Microbes in the Environment	54	Ex. 13 Complete		
Ex. 13 Isolation of Bacteria	62	Ex. 14 Transfer of Bacteria	73	
		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)	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 <u>'UNKNOWN' REPORT DUE</u>	Ex. 33 Skin Culture (con'd) 182 - Gram Stain/Catalase Test on 1 colony - Streak Gram (+) cocci/Catalase (+) colony to a 2 nd MSA plate and 1 nutrient agar slant Ex. 35 Mouth (Saliva) culture 199 - Inoculate an MSB Agar plate and Chrom AgarCandida plate
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 Esculin Hydrolysis Test		
		- Set up MacConkey Agar Plate		
		Ex. 36 Urine Culture	208	
		- Complete		

Apr 13/15	Ex. 37 Intestinal Culture (con'd)	215	QUIZ 7 (Ex. 33, 36, 37)	
	- Complete Bile Esculin Hydrolysis Test		Ex. 37 Intestinal Culture	215
	- MacConkey Agar plate:		- Set up Urea Test, Citrate Test,	
	- Gram Stain 1 LF colony		SIM Test, And an EMB Agar plate	
	- Streak a LF/Gram (-) rod to a		Ex. 38 Antimicrobial Drug/ Antibiotics	222
	2 nd MacConkey Agar plate and		* Use Intestinal 'Unknown'	
	a Nutrient Agar slant			

ABSTRACT DUE

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

Apr 27/29	QUIZ 8 (Ex. 38, 39, 40, 41, 42)		PRACTICAL 2	
	Ex. 43 Protozoa and Helminths	246	(<u>All</u> 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

	<u>Total Points</u>	<u>Student's Score</u>	<u>%</u>
Quiz 1	20	_____	_____
Quiz 2	20	_____	_____
Quiz 3	25	_____	_____
Quiz 4	25	_____	_____
Quiz 5	25	_____	_____
Quiz 6	20	_____	_____
Quiz 7	20	_____	_____
Quiz 8	20	_____	_____
Practical 1	75	_____	_____
Practical 2	75	_____	_____
Unknown Report	50	_____	_____
Abstract	30	_____	_____
Skin Culture Report	10	_____	_____
Throat Culture Report	10	_____	_____
Mouth Culture Report	10	_____	_____
Urine Culture Report	10	_____	_____
Intestinal Culture Report	10	_____	_____
Laboratory Technique:			
Direct Stain	2	_____	
Negative Stain	2	_____	
Gram Stain	2	_____	
Acid-Fast Stain	2	_____	
Endospore Stain	2	_____	
Microscopy skills	5	_____	
Work ethic and safety	5	_____	
<u>Total Points for Lab</u>	475	_____	_____

***(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 antisera 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.