MICROBIOLOGY LAB

BIOL 4040/5040/7040

Spring 2010

Wednesday 9:00-11:50 am (section 003)
2:00-4:50 pm (section 001)
7:05-9:55 pm (section 002)

Instructor:
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Teaching Assistants: Shuang Hu (section 003)
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Tina Agarwall (section 002)

Office Hours:
Contact the instructor by email or by appointment. Consult with TAs for their individual office hours.

Course Description:

This lab examines basic microbiological techniques. Students will be exposed to the different methods used to study microorganisms, basic biochemical and molecular biological properties of microorganisms and methods for controlling microorganisms. The laboratory manual was prepared by Dr. Scott Leisner after a manual originally compiled by Dr. Louis Glatzer of the Biology Department at The University of Toledo.

2010 Spring **Laboratory Schedule**

Please note: *this is a tentative syllabus and it may be changed during the course of the semester.*

Week	***Lab No.***	**Date**	**Lab Title**
1	***1***	1/13	Introduction To Microscopy
2	***2***	1/20	Introduction To Staining
3	***3***	1/27	Isolation Of A Pure Culture And Bacterial Growth Characteristics

Make observations of bacterial growth 24 hours after class.
Complete the lab during the Week 4 lab time.

4	***4***	2/3	Bacterial Growth On Specialized Media

Make observations of bacterial growth 24 hours after class.
48 hours prior to lab of week 5, inoculate the Indole test cultures.
24 hours prior to lab of week 5, inoculate cultures for the Methyl Red, Voges-Proskauer, and Citrate tests

5	***5***	2/10	Bacterial Enzymes

24 hours prior to lab of week 6 sample the mixed plate and inoculate an EMB plate.

6	***6***	2/17	Begin *E. coli* Isolation
	7		Induction And Characterization Of Bacterial Mutants

24 hours following the lab of week 6, pick colonies for E. coli lab and inoculate onto L-agar plate.
24 hours following the lab of week 6, examine your control and plates exposed to UV light and record results.
48 hours following the lab of week 6, refrigerate plate inoculated with putative E. coli the day before.
Complete the E. coli isolation lab during the Week 7 lab time.
Complete mutant characterization during the Week 7 lab time.

24 hours prior to lab of week 7, check growth on L-agar plate from lab of week 6, inoculate new plates, perform Catalase test.

7	***6***	2/24	Complete *E. coli* Isolation,
	7		Complete Mutant Characterization

24 hours following the lab of week 7, perform the Indole, Methyl Red, Voges-Proskauer tests if not performed already, Gram stain bacteria.
24 hours following the lab of week 7, make observations on your mutants.

8	***8***	3/3	Begin Virology, Mock Lab Practical
9		3/10	Spring Break, No Lab

Week	*Lab No.*	Date	Lab Title
10	***9***	3/17	Bacterial Growth Curve, ***First Lab Report Due***

24 hours following the lab of week 10, pull your plates out of the incubator and refrigerate until next week. You will complete this lab during the week 11 lab time.

11	***10***	3/24	Bacterial Responses To Antibiotics

24 hours following the lab of week 11, make your observations.

12	***8***	3/31	Complete Virus Lab
	11		Molecular Basis Of Antibiotic Resistance

Be sure to bring in your disinfectants for lab of week 13!

13	***12***	4/7	Microbes And Man

24 hours following the lab of week 13, make your observations.

14	***13***	4/14	Mammalian Defenses Against Microbial Attack

24 hours following the lab of week 13, make your observations for the lysozyme experiment.

15	***14***	4/21	Effects Of Environmental Conditions On Bacterial Growth

24 hours following the lab of week 13, make your observations on bacterial growth.

16		4/28	***Lab Practical Final Exam, Notebooks And Second Lab Report Due*** *(Wednesday)*
17		5/3-5/7	Finals Week

Grading

Grades for this course will be based upon:

Quizzes, twelve worth 10 pts each	100
Lab Notebook, worth 40 pts	40
Lab Report 1, worth 40 pts	40
Lab Report 2, worth 60 pts	60
Lab Performance	20
Lab Practical final exam worth 140 pts	140
Total points:	400

I. Quizzes

There will be one quiz each week except for week 1 and week 15. This is a total of 12 quizzes but your quiz grade will be based on your best 10 scores. In other words, you get to drop your lowest 2 quiz scores. Quizzes will be based on material from the previous lab and the material for the lab of that day. Quizzes will be given at the beginning of the class and no make-up quiz will be given if you are more than 5 minutes late for class.

II. Lab Notebook

A notebook with a sewn binding (no spiral binding or loose-leaf paper) that should catalog what you have done in the lab. It should be organized in the following manner:

Any changes in the protocols for each experiment.
Notes on each experiment.
Data for each experiment.
Conclusions for each experiment.

Your notebooks are to be turned in with your second lab report. See Appendix C for assistance with organizing your notebook.

III. Lab Reports

Students are required to turn in two lab reports, one covering the materials from week 1 to week 7 (labs 1-7) and the second covering the materials from week 10 to week 15 (labs 8-14). Your lab reports should be no longer than 40 pages and are to be written as described in this manual (see Appendix D). The lab reports will be graded according to the following scale:

	Lab Report 1	Lab Report 2
Abstract	4	6
Introduction	6	8
Materials and Methods	2	2
Results	22	35
Discussion	6	9
Total	40	60

Lab Report 1 is due at the beginning of class, the week after Spring Break. Lab reports turned in after class has begun will be considered as late and you will penalized 10%. *Students turning in lab reports late will be penalized at a rate of 10% loss of the grade per day turned in late.* Lab

Report 2 is due during the week before Finals week. Your instructor will inform you of the exact due date and time.

IV. Lab Performance

Because this is a laboratory course, you must have a practical working knowledge of various techniques such as proper sterile technique, the Gram stain, labeling your plates correctly, as well as cleaning up your laboratory area. It is essential that each person must pull their weight even though you will be working in groups of two. Your performance will be evaluated by your instructor.

V. Lab Practical-Final Exam

The lab practical final exam will test your understanding of the various techniques and organisms examined during the semester. This exam will be comprehensive. To give you practice, a mock lab practical exam will be given during week 8. Your instructor will give you the answers to these questions during the lab.

VI. Attendance

Laboratory experiments will begin promptly and most require the full class time. Instructions and advice will be given at the outset of the lab as well as the quizzes. Therefore, it is critical for you to be in class on time. If you are late to class more than twice during the semester, you will lose half of your Lab Performance points. If you must miss a lab, make sure to notify both your lab instructor and your lab partner prior to the lab. If you miss 2 labs, you automatically fail the course. In addition, it is your responsibility to obtain the results for the experiments from your lab partner. There will be no make-up quizzes, those that you miss will just be counted as quizzes you drop.

VII. Preparation

In most experiments you will be working with live bacteria and viruses and certain of these organisms can be pathogenic. It is important for you to understand the purpose of the experiments the sequence of steps and operation of equipment before you begin the experiment. Therefore, it is essential that you read through the lab materials prior to attending the lab. The quizzes will contain questions pertaining to the procedure that you are about to perform in order to encourage you to understand the lab before you begin. There are also a number of basic rules that you must follow to allow the course to be run safely and smoothly. These rules are on the next two pages.

VIII. Group work

All experiments are to be done in groups of two unless otherwise specified. Be sure to come prepared for the lab for your own benefit and for that of your partner. Even though the students will be working in groups of two and the results of experiments will be shared, all lab reports are to be written individually. In addition, each student must demonstrate their competence to develop a good Gram stain and your instructor will note this information in their records. Failure to accomplish this task will cost you a letter grade.

IX. Originality

Students are not to plagiarize the laboratory manual or each other's work. All lab reports are to be written in the student's own words. Hence, even though students may be working in groups, each lab report should be unique to a particular student. Students who plagiarize each other will receive at most 50% of the points for that particular assignment. Students who plagiarize the laboratory manual will also receive the same penalty.

Microbiology Laboratory Rules

Most of these rules are common sense. Since you are working with microorganisms, some of which could be pathogenic (i.e., disease causing), it is very important to take several precautions. Be careful working with these organisms for both yourself and for others that may have contact with you!

1. Under **NO** circumstances is eating, drinking, or gum chewing allowed in the laboratory.

2. Purses, Book bags, textbooks, and notebooks may be placed under the counters or in your assigned lab drawers but never on the counter or shelf above the counter.

3. Coats and other clothing accessories should be left on the coat rack in the front of the laboratory.

4. **NEVER** return opened or used materials to the supply bench without telling your lab instructor.

5. Hands should be washed before and after lab work.

6. Lab countertops must be cleaned with disinfectant (Roccal) both before and after lab work.

7. Hence, you should clean you bench and wash your hands before leaving the lab.

8. Immediately report any accidental spill of microbial cultures to your lab instructor.

9. Contaminated material is to be placed in the proper containers at the completion of the experiment: **NEVER** put contaminated material in waste baskets or sinks or on the countertop.

10. Slides containing microbes are to be put into a slide morgue or glass container labeled "contaminated" after the experiment is completed.

11. Plastic petri plates inoculated with microbes should be discarded in the orange biohazard bags upon completion of experiments.

12. Contaminated/used pipettes (except Pasteur Pipettes) are to be placed into pipette jars labeled "Bleach Morgue."

13. Contaminated Pasteur pipettes are to be placed tip down in glass containers labeled "Lysol Morgue."

14. All other contaminated materials should be discarded on the metal cart provided for this purpose.

15. Because this course is MICRObiology, it is essential that proper care of microscopes be adhered to. All microscopes should be cleaned, covered, and placed in the appropriate location. Abuse of microscopes will not be tolerated!

16. In addition, microscopes are to be set with the low power objective in position above the condenser and lowered as much as it will go.

17. Labeling: All labeling is to be done with a organic solvent-based (non-water based) "Sharpie" type permanent marking pen.
    Petri plates: Should be labelled on the bottom with your name and other necessary information.
    Test tubes: May be labelled on the glass surface of the tubes or on a piece of tape put onto the glass surface of the tube but **NEVER** on the cap.
    Test tube racks: Are to be labelled with masking tape but no markings should be made directly on the rack itself with any form of marker.

18. A drawer will be assigned to each group. The instructor will unlock and lock the drawers for each lab section.

19. Open lab times will be posted by the instructors. It is absolutely essential that Dr. Leisner or a teaching assistant be present at all times during open lab times! The lab is open only during those times and no others. If you cannot make it in to a standard open lab time, please let your instructor know so that they can make other arrangements. If you miss coming in for open lab to inoculate cultures or to make observations 3 times during the course of the semester, you fail the course

20. You are required to have the following lab supplies available for each lab:
    1 Lab coat (See your instructor prior to purchasing one, you are required to keep clean, if necessary, you need to wash it at home).
    1 "Sharpie" type permanent marking pen.

21 You should keep the following lab supplies in you drawer:
    1 Lab coat (See your instructor prior to purchasing one).
    1 "Sharpie" type permanent marking pen.
    Gram staining kit (Supplied)
    Inoculating loops (Supplied)
    Glass spreaders (Made by each student or supplied)

22. You will be using some containers filled with bleach. This chemical kills bacteria very quickly. However, it can also stain your clothes so be careful when using it.

23. For many experiments, you will be using a flame to sterilize materials. NEVER LEAVE A FLAME UNATTENDED!!!!

STATEMENT ON ACADEMIC DISHONESTY

Department of Biological Sciences

Academic dishonesty by students enrolled in undergraduate or graduate courses and programs offered by the Department of Biological Sciences will not be tolerated. Academic dishonesty includes but it not limited to:

1. Obtaining assistance from another individual during an examination.

2. Giving assistance to another individual during an examination.

3. The unauthorized use of study material or textbooks during an examination.

4. Changing answers on an examination after it has been returned and then submitting it for re-grading.

5. Plagiarizing written assignments. Plagiarizing includes but is not limited to: a) Copying laboratory reports from previous years, b) copying or paraphrasing reports, term papers, or theses prepared by other students, c) unauthorized collaboration in the preparation of reports, term papers, or theses, and d) use of another author's materials without appropriate acknowledgment through quotation and citation.

6. Attempting to bribe or otherwise induce an instructor to alter either a grade or examination score.

7. Obtaining or attempting to obtain a copy of an examination prior to its administration.

In accordance with policies presented in The Student Handbook and The University Catalog, Instructors have the responsibility and right to report cases of alleged dishonesty to departmental, college, and university administrative units. Students involved in academic dishonesty may expect to receive a grade of F on specific assignments as well as in the course where the assignment was made. In addition, disciplinary action may be recommended through appropriate college and university disciplinary committees. Please consult your instructor for instructions on the implementation of this policy.