

# METX 119L Syllabus

## WHAT YOU NEED FOR THE LAB

1. Each lab exercise (background, actual protocols, assignments) are/ will be available as PDFs via email. You need to download and print copies so you can have them with you in the lab.
2. Recommended book: A Photographic Atlas for the Microbiology Laboratory, 4<sup>th</sup> Edition. Available at Bay Tree Books.
3. A three ring binder with 10 dividers.
4. Binder paper (three hole punched), can be lined or graph-style
5. Additional handouts will be available in pdf formats and can be downloaded from the course website.

## COURSE OVERVIEW AND LEARNING OBJECTIVES

**Overview.** Microbiology laboratory provides a foundation in laboratory skills that are used in diverse areas of microbiology including basic research, food production, and microbial quality control.

Each lab exercise has a written description, from which you will create a pre-lab. The pre-lab is the first page of the lab notebook for that exercise. Each exercise will end with either an assignment or a lab report to complete.

### **Learning objectives:**

1. Be able to work safely in the lab
  - a. *Always read the lab exercise before coming to lab*
  - b. *Follow protocols accurately*
  - c. *Arrive to lab at least 5 minutes before start time so that you can put away your stuff, and put on lab coat*
  - d. *Know safe laboratory techniques and consistently practice them*
2. Know how to make media and solutions
  - a. *Given a recipe or final concentrations, be able to create solutions*
  - b. *Be able to use pipetmen, glass pipets, scales, and Erlenmeyer flasks to accurately measure*
  - c. *Understand the differences between different types of media used in class*
3. Be able to use sterile technique
  - a. *Understand how the autoclave works*
  - b. *Be able to keep solutions sterile, and start cultures that are not contaminated*
4. Cultures and enumerate microbes on solid and liquid media
  - a. *Be able to inoculate liquid and solid cultures*
  - b. *Be able to streak for single colonies starting from liquid or solid cultures*
  - c. *Be able to perform serial dilutions and plating*
  - d. *Be able to determine optical density of a liquid culture*
  - e. *Be able to isolate a pure culture from a mixture of microbes*
5. Be able to work safely with pathogens
  - a. *Know and consistently practice safe laboratory techniques*
6. Be able to examine microbes using the microscope
  - a. *Be able to focus on a sample all the way up to 100X*
  - b. *Know when to use brightfield or phase contrast*
  - c. *Be able to accurately perform and interpret a gram stain*
  - d. *Be able to measure microbes using a stage and ocular micrometer*
7. Be able to analyze microbial characteristics
  - a. *Calculate growth rate*
  - b. *Select and interpret microbiology biochemical tests*

8. Keep an accurate, complete, and up-to-date lab notebook
  - a. *Keep a written and current record of all procedures and results*
  - b. *Perform data analysis—such as graphs, tables as appropriate*
  - c. *Write logical and well founded conclusions*
9. Design experiments
  - a. Be able to state a question and hypothesis
  - b. Design experiments to test the hypothesis
10. Work cooperatively with others
  - a. Come to lab with a solid understanding of the exercise
  - b. Work with your partner to decide how to share the work
  - c. Be respectful of your partners
11. Communicate science
  - a. Prepare graphs and tables that show your results
  - b. Prepare written lab reports that are clear, complete, and use college level grammar
  - c. Prepare clear oral presentations
12. Develop a working familiarity with the scientific literature
  - a. Be able to search for keywords, title words, and authors on Pubmed, and obtain papers
  - b. Be able to read scientific papers for key information

### **COURSE WORK AND GRADING**

Grading is based on the following breakdown:

1. Notebook/Assignments (14 assignments)	280
2. Prelabs (14)	70
3. Laboratory Report (2)	150
4. Demonstrated Competencies (5)	50
5. Quizzes (2)	70
6. Lab Practical Exam	120
7. Oral Presentation	75
8. Attendance, Lab Skills, and Lab Safety	90
<b>Total Points</b>	<b>905 points</b>

#### **1. LAB NOTEBOOK and ASSIGNMENTS**

**Lab Notebook.** For each lab exercise, you will keep a lab notebook. Your lab notebook will consist of a three ring binder and dividers that separate each lab exercise for your notebook. Place a copy of the exercise instructions at the beginning of each section, and then follow that with your written description of what you did, using regular binder paper.

Include the following:

1. A date on each page.
2. Page number, as in 1-1, 1-2, for exercise 1 page 1 etc.
3. Title: short but informative
4. Purpose: what is the reason for doing this experiment
5. Methods overview. A list of the methods that will be used  
 These first items (1-5) are what you need in the pre-lab
6. Methods in detail. Write out what you did, even if you do exactly what was printed in the exercise. .
7. Results.
8. Conclusions: write out what you can conclude from the work.
9. Graphs, tables and other assignment questions.
- 10.

**Assignments.** For each exercise, you will hand in:

- 1) The pages from your notebook that includes all items listed above
- 2) Any additional information requested at the end of each exercise.

These assignments are designed to teach scientific record keeping, writing, and data presentation. Assignments are due generally 1 week following the end of that particular exercise. Due dates will be provided in a handout. Do not hand in the Exercise instructions.

## **2. PRELABS**

For each exercise, you need to prepare the prelab before you can start. The prelab consists of parts 1-5 above (marked in grey). To earn full points, the prelabs must be complete and done before class starts. The TA or Instructor will verify the completeness of pre-lab write-up at the start of the lab session. Please have your pre-lab write-up ready at the beginning of class. No points will be given for late pre-labs; you are required to have a completed pre-lab before starting an exercise.

## **3. LABORATORY REPORTS**

Lab reports will be written up in the format of a typical scientific research article. Each will contain these sections (1) Introduction; (2) Materials and Methods; (3) Results; (4) Discussion; (5) References; (6) Tables and Figures. All lab reports must be typed and double-spaced. You should use 1 inch margins and times 12 point font. Tables, figures and graphs, unless otherwise specified, must be computer generated and computer labeled.

Specific guidelines will be given in advance of the report. Effective scientific writing is one of the most important skills that you can develop--we strongly encourage that you show your draft lab reports to your instructor and/or TA for comments before the due date.

## **4. COMPETENCY DEMONSTRATIONS**

There will be five skills you will have to demonstrate to your TA. The five competencies are:

1	Students regularly writes complete and clear methods
2	Student use sterile techniques to inoculate a liquid culture
3	Student can successfully obtain single colonies using a streak plate
4	Student can focus on 100X
5	Student can describe findings reported in the scientific literature

## **5. QUIZZES**

There will be two short quizzes given during the class. These will test your understanding of the information presented during lecture and laboratory. The format may be short answer, fill-in-the-blank, or multiple choice.

## **6. LAB PRACTICAL**

A practical exam covering several microbial techniques will be administered in the course. It will cover proper use and execution of the various techniques you learned in the course.

## **7. ORAL PRESENTATION**

You will present a scientific paper as a slide-based oral presentation. You will be graded on the quality of the slide, presentation and answers to questions. The details will be further discussed in class.

## **8. ATTENDANCE, LAB SKILLS, LAB SAFETY**

You will receive points based on your performance in the lab class that will take into account the following:

- 1) Whether you come well prepared for the lab;
- 2) Whether you communicate well with your partners and clearly do a fair share of the work
- 3) Whether you arrive on time
- 4) Whether you operate safely in the lab;
- 5) Whether you clean your area and properly dispose of materials

## **POLICIES**

**1. ALL assignments, exams, and presentations must be complete and turned in to receive credit for this course.** If you need to miss an exam for a legitimate reason (illness, accompanied by medical doctor's note, or death in the immediate family), you must notify Dr. Olariu at least 24 hours in advance of the exam to schedule a make up.

**2. Policy on late assignments/reports:** Items turned in late will receive an automatic 50% deduction in point value per day. We will not accept anything that is turned in more than 2 days late.

**3. Policy on plagiarism:** All work you submit must have been written by you and ideas properly cited. Information is available at: [http://undergraduate.ucsc.edu/acd\\_integrity/resources.html](http://undergraduate.ucsc.edu/acd_integrity/resources.html). Any plagiarized material will receive a score of 0; two cases of plagiarism will result in a failing class grade.

**4. Policy on attendance.** Prompt attendance of lab lectures and sections is required. Unexcused absences or arriving late will affect your grade.

You will be **excused** from lab for the following reasons:

- Sickness or injury on the day of, or immediately prior to, the lab session.
- Death, serious illness, or other catastrophic event in the immediate family.
- Jury duty; written documentation required.
- Days of religious observance as recognized by University policy.

You will **not be excused** for:

- Intramural or intercollegiate athletic events
- Social or travel events.
- Car trouble, broken alarm clock, etc., etc.

## **ADDITIONAL REFERENCE MATERIAL**

**Texts:** You should utilize your microbiology textbook as a reference, or if you don't have it anymore, use Prescott's Microbiology or the on-line free text called Todars Microbiology, at <http://www.textbookofbacteriology.net/>

**Scientific literature.** Successful lab reports will require you to investigate more deeply the subjects presented in the course. This investigating will require library research and citation of scientific research collected from journal articles. Pubmed is the primary literature databases used by research scientists. Google searching can get you some useful information. However, websites should be used with caution. Exceptions might be made when referencing Kenyon Micro Wiki, CDC, FDA, NIH, or EPA publications.