

# MICROBIOLOGY

Fall 2015 Course Syllabus for BIO 210

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This course is a four credit hour introduction. This classroom portion of the course meets three hours a week and the lab portion meets an additional three hours a week. The course will cover numerous aspects of the microbial world; however, it will concentrate on human-microbe interactions.

We will cover the basics of microbial life, such as anatomy, genetics, and life cycle. Unlike most classes where you look at life through the eyes of humans, in this class you will be asked to observe life as a microorganism. As the course progresses, you might ask yourself some of the following questions: 1) What does “my” (referring to you as a microbe) body look like and what is it made of? 2) How do “I” reproduce? 3) What kind of food do “I” eat? 4) How do “I” get into one of those huge luscious food sources called a human? 5) How do “I” avoid those nasty white blood cells and poisons those inhospitable hosts throw at me?

**Credit Hours:** 4 (3 lecture, 3 lab)

**Prerequisites:** Biology

**Lecture Times:** All Sections – Tuesday and Thursday from 1:00 – 2:20 p.m. (3407)

**Lab Times:** Section 01 – Monday from 2:00 – 4:50 p.m. (Rm 3303)

**Lecture Text:** Todar, K. (2012). *Todar's online textbook of Bacteriology*. Available at <http://textbookofbacteriology.net/index.html>

*Biology*. (2013). Available from OpenStax College at [http://openstaxcollege.org/files/textbook\\_version/low\\_res\\_pdf/11/col11448-lr.pdf](http://openstaxcollege.org/files/textbook_version/low_res_pdf/11/col11448-lr.pdf).

**Lab Manual:** Cain, D., Hanks, H., Weis, M. Bottoms, C. & Lawson, J. (2014). *Microbiology laboratory manual*. Available from Collin County Community College at <http://iws2.collin.edu/dcain/CCCCD Micro/index.htm>. Click on Lab Manual for BIOL 2420

**Instructor:** James Bier, Ph.D.

- **Office:** 3811
- **Phone:** 251-1499 (office)
- **Email:** [bier@mercycollege.edu](mailto:bier@mercycollege.edu) (very strongly preferred over [james.bier@mercycollege.edu](mailto:james.bier@mercycollege.edu))
- **Web:** <http://members.toast.net/bier/mercy.html>
- **Office Hours:** Office hours are set up so that you can discuss concerns about the class, ask for clarification on the classes or reading material, or just to talk about microbiology, biology, or life in general. If the set hours are not convenient, call me so that we can set up a time that is mutually agreeable. Please visit the web site to see the current office hours.

**The instructors reserve the right to make changes to the syllabus. All policies in the College Catalog, Program Handbooks and the Mercy College of Ohio Student Handbook are applicable to this course.**

## GRADING

The classroom portion of the class will make up two-thirds of the course grade. Grades for this portion of the class will be based on the results from several quizzes and a comprehensive final. **Note:** Additional assignments may be added if the instructor deems it necessary. Also, the grading system may be adjusted to better measure student performance.

Each quiz, worth 30 points each, consists of true-false, multiple choice, fill in or short answer questions. These quizzes will cover between one-half and two chapters of material and will be given one week after a topic has been finished. Only the top six quiz scores will be counted and the lowest quiz scores will be dropped. The final is comprehensive, will consist of true-false and multiple choice, and may include any other types of questions I deem useful to determine your level of comprehension. The final exam carries the weight of four quizzes.

**There will be no makeup quizzes.** However, missing a quiz will not be held against you. If you do not finish at least six quizzes, the missing points will be made up as part of the comprehensive final. That is, the final, which is worth 120 points, would now be worth 150 points (120 points normal weight + 30 points for the missed quiz). Taking only four quizzes would increase the value of the final exam to 180 points. Hypothetically, it is possible to not take any quizzes without suffering any adverse effects on your grade; however, the final exam would be worth 300 points.

“Bug of the Week” presentations will be created by groups of three or four students. These presentations must be constructed in Microsoft Powerpoint<sup>®</sup> and must be turned in to the instructor by nine a.m. on Thursday (for Monday presentations) or Tuesday (for Wednesday presentations). The in-class presentation will run between five and eight minutes with an additional three to five minutes for questions. **Material covered in these presentations will appear on the quizzes.**

Grades in the lab will be based on 1) two quizzes, 2) written observations and conclusions from lab exercises, isolations and characterizations, 3) demonstration of lab skills, and 4) participation, cleanliness and maintenance of your work area. Due to the nature of the lab, missed labs are difficult to make up. Therefore, attendance at the regularly scheduled lab time is strongly recommended. However, you are welcome to come to another lab section to prevent yourself from falling behind. If you cannot avoid missing a lab, please contact me ahead of time. I will do my best to provide you with the materials necessary to make up a lab, but I cannot guarantee that a lab can be made up.

To record daily observations on graded exercises, students will maintain a notebook that **includes separate sections for each of the different isolations and identifications.** Your notebook can be bound or sheets of loose leaf paper separated in a binder. This semester your notebook will include sections for exercise 2 (*Bacillus* Isolation from Soil) and exercise 6 (*Staphylococcus* Isolation from Skin). Since the notes **must be written in lab**, they must either be handwritten or written on a laptop computer that you bring to the lab. **I will only grade the original notes, and do not worry about some sloppiness.** The appropriate sections of the notebooks will be collected and graded regularly throughout the semester.

The following is a breakdown of the points for this class.

	Points
Lecture (67%)	
• Quizzes (top six worth 30 points each)	180
• Oral Presentation	30
• Comprehensive Final Exam	120
Lab (33%)	
• Written Lab Exercises (top five worth 20 points each)	100
• Lab Quizzes (two worth between 25 and 40 points)	65

The number of points that you achieve throughout the semester will determine your final grade. The table to the right lists the minimum percentage required for each letter grade. You can determine your grade by dividing the number of points that you have achieved and dividing by the total points available (495 at the end of the semester).

Course Grade	Percent Needed
A	90%
B	80%
C	70%
D	60%

## LECTURE OBJECTIVES

1. Describe the importance of microorganisms and their relationships with other organisms.
2. Discuss scientific methods using the experimental advances in microbial knowledge.
3. Describe and differentiate the two types of microbiological cells.
4. Identify the structures and functions of the subcellular components of both types of cells.
5. Describe the basic anatomy and lifecycle of viruses.
6. Identify microbial nutritional requirements and growth patterns.
7. Describe basic genetics, genetic control, mutation and recombination in microorganisms.
8. Identify and differentiate important groups of bacteria, fungi and protozoa.
9. Describe methods of microbial control and chemotherapy.
10. Relate the methods of microbial control to the anatomy, physiology, metabolism and genetics of microbes.
11. Define the principles and mechanisms of disease, pathogenicity, and epidemiology.

## LAB OBJECTIVES

1. Isolate and cultivate bacteria while utilizing sterile technique.
2. Examine and differentiate bacteria by staining and microscopy.
3. Characterize and identify common types of bacteria using selective and differential media and an array of physiological tests.
4. Identify microbial nutritional requirements and growth patterns.
5. Describe methods of microbial control and chemotherapy.

## MERCY COLLEGE STUDENT LEARNING OUTCOMES

1. Exhibit **proficiency** and competency within one's discipline in service to others – Students utilize the scientific method to describe the set up of experiments and discuss the conclusions from results of experiments.
2. Integrate **critical thinking** skills to reason logically using data from appropriate disciplines to solve problems and make decisions – In this class, critical thinking will be defined as the ability to apply, analyze, synthesize, and evaluate information. While all topics will involve a great deal of memorization, students will also be expected to apply that information to answer questions, utilize information for earlier in the semester to answer questions later in the semester, and synthesize two or three pieces of information to develop a viable conclusion to a problem. In the laboratory, students will logically analyze the results of microscopic observations and physiological tests to identify a randomly assigned unknown.
3. **Communicate** clearly in both written and oral forms of expression – Students may be asked to write short essays on important topics in microbiology, answer short (approximately ½ page) essays on quizzes, or summarize scientific articles. In the “Bug of the Week” presentations, groups of students will orally describe a medically important microorganism for the rest to the class. In the laboratory, students will write detailed descriptions (and possibly drawings) of their activities and observations.

## HUMAN BIOLOGY PROGRAM LEARNING OUTCOMES

1. Demonstrate **competency** in mathematical computations related to understanding and application of scientific principles. – Students will calculate allele and genotype frequencies in populations and analyze the results to determine if the populations are evolving.
2. Apply the **scientific method** to examine and interpret biological questions – Students will describe, set up, run and discuss experiments and their conclusions using appropriate scientific experimental procedures.
3. Demonstrate competency performing **laboratory** techniques – Students will develop their observational skills, both macroscopically and microscopically, while classifying the taxa of life.