# Microbiology 3003

Instructor contact information: TBA

E-mail: TBA

Class meetings: TBA Room: TBA

Office hours: TBA

***Course Summary:***

This course is an introduction to the diversity of microorganisms, their structure, their metabolism and the molecular mechanisms underlying their growth and replication, and the composition and dynamics of microbial communities associated with humans and communities from the environment.

***Learning Goals and Objectives:***

Following completion of the course students should be able to describe the most important characteristics of the major classes of microorganisms, including bacteria, viruses, fungi, and algae. Students should be able to describe the cellular, molecular and biochemical differences (and similarities) between prokaryotes and eukaryotes. Students should be able to give examples of specific microorganisms, the environmental niches they occupy, and what special cellular, molecular, or biochemical features allow them to thrive in those niches. Students should be familiar with the experimental contributions made to the field by prominent microbiologists, cell biologists, immunologists, biochemists and ecologists. At the completion of the course students should feel prepared for advanced level coursework in microbiology, infectious diseases and immunology, epidemiology and public health, biotechnology, or environmental sciences. Students should finish the course with an appreciation and understanding of the fundamental role microorganisms play in daily life and how they have shaped culture and society throughout history.

***Required Textbook:***

Microbiology: A Human Perspective Nester et al 7th, 8th, 9th or 10thedition, McGraw Hill

***Grading:***

| **Component** | **Percent of final grade** |
|---|---|
| *Attendance and participation* | 10%** |
| *Concept maps* | 15% |
| *First midterm exam* | 25 %* |
| *Second midterm exam* | 25 %* |
| *Pop quizzes* | Up to 5 points/quiz can be added to your most recent exam grade |
| *Final Exam* | 25 %* TBA by Registrar |

**Please note: There are no make-up exams. If you miss one exam, you must take a cumulative final. Missing two exams is an F for the course.*

***It is expected that your attention will be focused on the material being presented in class, not your cell phone. All cell phones are to be stored in your bookbag/purse. Using your cell phone during class will lead to a loss of 1 point from your final grade per infraction. A five-minute break will be given from 10:45-10:50 at which time you may check your phone.*

Attendance is required at each meeting. You must arrive on time, and you must stay for the entire class.

Exam schedules*: TBA

Final Exam: TBA

** Students must take the midterm and final exams at the scheduled times. Scheduled midterm exams dates may change with advance notice.*

**Tips for Effectively Studying and Preparing for Quizzes and Exams**

Students should expect to devote 2-3 hours of focused studying outside of class for every hour in class. Students should come to class having reviewed the assigned materials and prepared to ask and answer questions.

**There are several useful resources you have for this class:**

- Lectures/slides
- In-class discussion
- Assignments
- Textbook
- Power Point Presentations and other weekly blackboard-curated reading and viewing assignments
- Office Hours

**Prior to each class meeting follow these steps:**

Read the Key Terms and Learning Outcomes from each assigned chapter to see what concepts/material are being stressed. Read the assigned textbook chapter. Take notes on your reading. Write down any questions you have and make note of concepts that you find confusing (or interesting) to discuss in our class meeting.

Come to class on time with your questions written down in your notebook. If your questions are not addressed, make sure you interrupt and ask your questions during class. If you do not ask your questions during class, then come to office hours with your questions.

After the lecture, re-read the textbook chapter and go through the Power Point presentation again. Write down any new questions you have and make note of concepts that you still find confusing. Make sure you find the answer to the remaining questions by asking in the next class, coming to office hours, or answering them with classmates.

Make sure you are comfortable with any new terms or definitions that were introduced in the chapter material or the Blackboard Collaborate meeting. Be sure to come to every class meeting prepared and on time. There may be quizzes and assignments that contribute to your grade given during class time. In addition, during class it is the best time to ask any questions you have in the course material.

As an educator, I support the rights of undocumented students to an education. If you have any concerns in that regard, feel free to discuss them with me, and I will respect your wishes concerning confidentiality. For resources and support, please visit Brooklyn College's Immigrant Student Support Office located at 117 Roosevelt Hall. You can also contact them via email at ISSO@brooklyn.cuny.edu or via phone at 718-951-5023.

***Center for Disability Notice:***

The Center for Disability Services (CSDS) is committed to ensuring students with disabilities enjoy an equal opportunity to participate at Brooklyn College. To receive disability-related academic accommodations, students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment by calling (718) 951-5538 or emailing Josephine.Patterson@brooklyn.cuny.edu. If you have already registered with the Center for Student Disability Services, email Josephine.Paterson@brooklyn.cuny.edu to ensure accommodation emails are sent to your professor.

***University's policy on Academic Integrity:***

The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for policy implementation can be found at www.brooklyn.cuny.edu/bc/policies. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member MUST report the violation. Students should be aware that faculty may use plagiarism detection software.

Link to the library website: http://www.brooklyn.cuny.edu/web/academics/library.php

# Lecture Topics and Associated Chapters

***This is a tentative schedule and may change with prior notification.***

**Introduction to Microbiology**

-Describe important historical contributions and their implications to the field of microbiology.

-List important general contributions of microbes to organisms and the environment.

-Identify and describe members of the microbial world.

Reading: Chapter 1

**II. Microscopy and cell structure**

-Compare and contrast the anatomy of prokaryotic and eukaryotic cells.

-Describe the principles of the various types of microscopes used in microbiology.

-Describe the different types of staining used in microbiology.

Reading: Chapter 3

**III. Principles of microbial growth**

-Give examples of microbial growth in nature.

-Describe techniques used to grow, identify and quantify microbes in the laboratory.

Reading: Chapter 4

**IV. Control of microbial growth**

-Explain the principles of sterilization, disinfection, pasteurization, decontamination, sanitation and preservation.

-Compare and contrast different methods used to control microbial growth.

Reading: Chapter 5

**V. Microbial metabolism**

-Compare and contrast anabolism and catabolism.

-Describe the components of metabolic pathways.

-Describe the roles of the three central metabolic pathways.

-Distinguish between cellular respiration and fermentation

Reading: Chapter 6

**VI. Bacterial genetics**

-Compare and contrast spontaneous and induced mutations

-Explain how DNA mutations can be repaired

-Compare and contrast direct and indirect selection for bacterial mutants

-Distinguish between transformation, conjugation and transduction

Reading: Chapter 8

**VII. Identifying and classifying bacteria**

-Describe how bacteria are identified and classified at the genomic and phenotypic level.

Reading: Chapter 10

**VIII. The Diversity of bacteria and archaea**

-Compare and contrast the characteristics and habitats of anaerobic chemotrophs, anoxygenic phototrophs, oxygenic phototrophs, aerobic chemolithotrophs and chemoorganotrophs.

-List and give salient characteristics of bacteria that thrive in terrestrial environments and those that thrive in aquatic environments.

-Compare and contrast the examples of bacteria that use animals as habitats.

Reading: Chapter 11

**IX. Eukaryotic microbes**

-Describe the structure and habitats of fungi and protozoa.

Reading: Chapter 12

**X. Viruses, prions and viroids**

-Describe the general characteristics of viruses

-Compare and contrast lytic and lysogenic infections of bacteriophage.

-Describe the roles of bacteriophage in horizontal gene transfer.

-Describe the steps to animal virus infection including different strategies used depending on the type of nucleic acid molecule they carry.

-Describe techniques for cultivation of animal viruses.

-Compare and contrast viruses, prions and viroids.

Reading: Chapter 13

**XI. The innate immune response**

-List and describe the first line of defense against an infection.

-List and describe the cells of the immune system.

-Describe the complement system and how it works.

-Describe the inflammatory response and phagocytosis.

Reading: Chapter 14

**XII. The adaptive immune response**

-Compare and contrast cell-mediated immunity and humoral immunity.

Reading: Chapter 15