

## **General Microbiology 11:680:390**

### **Description:**

General Microbiology is a 4 credit course with two 1 hour 20 min lectures plus a mandatory 3 hour laboratory each week. The course is team taught by faculty of the Department of Biochemistry and Microbiology, SEBS.

This course covers basic principles of microbiology and provides an introduction to the diversity, physiology, morphology, genetics, ecology, applications and pathogenicity of microbes.

This lecture plus laboratory course is offered each Fall, Spring, and Summer.

### **Prerequisites and Registration Restrictions:**

Pre-requisites: 01:119:115-116 General Biology, 01:119:117 Biological Research Laboratory; 01:160:161-162 General Chemistry and 11:160:209 or 11:160:307 Organic Chemistry.

Non-Rutgers courses offered as alternate prerequisites are individually assessed and approved depending on content.

### **Faculty:**

**Course Coordinator & Lecturer:** Dr. Diane Davis (DD), [davis@aesop.rutgers.edu](mailto:davis@aesop.rutgers.edu)

**Lecturer:** Dr. Costa Vetriani (CV), [vetriani@marine.rutgers.edu](mailto:vetriani@marine.rutgers.edu)

**Lecturer:** Dr. Tamar Barkay (TB) [barkay@aesop.rutgers.edu](mailto:barkay@aesop.rutgers.edu)

**Lab Coordinator:** Dr. Ines Rauschenbach, [inesrau@aesop.rutgers.edu](mailto:inesrau@aesop.rutgers.edu)

### **Text:**

M. T. Madigan, J. M. Martinko, K. S. Bender, D. H. Buckley and D. A. Stahl. 2015 *Brock Biology of Microorganisms*. 14<sup>th</sup> edition. Pearson, New York, NY.

### **Lab Manual:**

Diane Davis & Ines Rauschenbach. 2014 *General Microbiology Laboratory Exercises*, Department of Biochemistry and Microbiology. Information regarding where and when to purchase electronic access to the manual is available on the lab web site; <http://rci.rutgers.edu/~microlab/>. Laboratory sections meet in Food Science, SEBS, Lab 209

### **Electronic Notebooks:**

Ipads are provided in the laboratory to keep an electronic notebook. Students are responsible for the cost of the LabArchives platform. Details will be provided before the semester begins.

**Grading:**

1. Grades will be based on lecture material 75%, laboratory 25% = 100%
2. Lecture grades are based on three (3) class period examinations. Exams are 50% multiple choice questions and 50% short answers. Materials to be covered in the exams are not accumulative.
3. Laboratory grades (25%) will be assessed on a range of written reports, quizzes and a practical examination. Refer to your lab manual for lab grade breakdown.

***NOTE: A student must satisfactorily complete the laboratory section in order to pass the class.***

**Overall Learning Goal:** Students are expected to gain a fundamental understanding of microbes including viruses, *Bacteria*, *Archaea* and eukaryotic microorganisms.

**Learning Goals for General Microbiology Lecture:**

After completion of the lecture component of the course, successful students will:

1. Demonstrate an understanding of the structural similarities and differences among microbes and the unique structure/function relationships of prokaryotic cells.
2. Comprehend the fundamentals of molecular microbiology.
3. Appreciate the diversity of microorganisms and microbial communities and recognize how microorganisms solve the fundamental problems their environments present.
4. Recognize how the underlying principles of epidemiology of disease and pathogenicity of specific microbes affect human health.

**Learning Goals for General Microbiology Laboratory:**

After completion of this laboratory, students should be able to:

1. Learn the proper use of a phase contrast microscope to observe microorganisms and report observed characteristics.
2. Practice and apply calculations related to the preparation of media, stock/working solutions, and culture dilutions
3. Apply their knowledge of microbial structure, growth, and metabolism to the identification of an unknown microorganism.
4. Summarize and apply concepts of molecular biology.
5. Demonstrate aseptic technique and perform routine culture handling tasks safely and effectively.
6. Apply scientific method to collect, interpret, and present scientific data in microbiology and related fields.

## Lecture Topics

<b>Lecture Topic</b>
<b>Microbial Cell Structure</b>
<b>Microbial Cell Structure/Function</b>
<b>Introduction to Viruses</b>
<b>Nutrition and Metabolism</b>
<b>Microbial Cell Growth</b>
<b>Principles of Microbial Molecular biology</b>
<b>Regulation of Gene Expression; Bacteria and Archaea</b>
<b>Bacterial Genetics</b>
<b>Industrial Microbiology</b>
<b>Microbial Evolution, Systematics and Taxonomy</b>
<b>Prokaryotes Bacteria (Pt. 1) Bacteria - Proteobacteria</b>
<b>Prokaryotes (part II continued) and Archaea</b>
<b>Ecology - Introduction</b>
<b>Ecology - Methods</b>
<b>Ecology - Ecosystems</b>
<b>Ecology (Cycling, Symbioses, Bioremediation)</b>
<b>Eukaryotic microbes (Protists/Fungi)</b>
<b>Viral Diversity</b>
<b>Microbial Growth Control</b>
<b>Microbial Interactions with Humans</b>
<b>Epidemiology</b>
<b>Person to Person Microbial Diseases/Vectorborne &amp; Soilborne Pathogens</b>
<b>Waterborne Microbial Diseases</b>
<b>Food Preservation &amp; Foodborne Microbial Diseases</b>