

**Bergen Community College**  
**Division of Mathematics, Science and Technology**  
**Department of Biology and Horticulture**

**Microbiology (BIO-104)**

**General Course syllabus**

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| <b>Course Title:</b>                   | Microbiology (BIO-104)   |
| <b>Course Description:</b>             | This is a laboratory science course that emphasizes the principles of biology as they apply to microorganisms. The morphology, anatomy, physiology, growth, metabolism, nutrition, control and identification of the various microbes, genetics including recombination technology, industrial and clinical case studies in microbiology are discussed. Representative laboratory exercises include staining procedures, media preparation, pure culture techniques, culture identification, and serology. |
| <b>Prerequisites:</b>                  | None (High School biology and/or chemistry essential)  |
| <b>General Ed Course:</b>              | Yes  |
| <b>Course Credits:</b>                 | 4.0  |
| <b>Hours per week:</b>                 | 6.0: 3 lecture and 3 lab   |
| <b>Course Coordinator:</b>             | Luis Jimenez   |
| <b>Required Lecture Textbook:</b>      | Tortora, Gerard, Berdell R. Funke and Christine L. Case.<br><u>Microbiology: An Introduction</u> , 12th edition. Benjamin/Cummings Publishing Co., Inc. Redwood City, California, ISBN: 13:978-0-321-92915-0.  |
| <b>Required Laboratory Manual:</b>     | Bablanian and Payne, Microbiology Lab Manual, 2 <sup>nd</sup> ed., Kendall-Hunt, ISBN: 978-0-7575-5789-7<br><b>All lab books must be new and unused.</b>   |
| <b>Supplementary Text: (Optional):</b> | Lammert, Techniques in Microbiology, Pearson, 2007   |
| <b>Materials:</b>                      | <b>All students must wear protective eye wear, vinyl gloves and laboratory coats. All lab books must be new and unused.</b>  |

## Student Learning Objectives:

### The student will be able to:

1. Students will examine the major principles of microbiology and the relationship of microbes to other living organisms. Assessment will be based upon performance on exam questions. Assessment can also be based on research papers/projects.
2. Students will demonstrate proper scientific procedure to identify various type of microbes. Students will be evaluated by observation in the laboratory and analysis of an unknown bacterium. Assessment will also be based upon performance on exam questions.
3. Students will be able to explain the scientific basis for each technique used. Students will be required to answer exam questions designed to allow them to demonstrate their acquisition and retention of this knowledge.
4. Students will report data using proper scientific laboratory record keeping. Students will be evaluated by periodic notebook collection.
5. Students will model critical thinking skills and apply them to both material presented in lecture and the analysis of data generated in the laboratory. Students will be evaluated by observation in the laboratory and analysis of experimental results. Assessment will also be based upon performance on exam questions.
6. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
7. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

## Laboratory Experiences:

1. Aseptic technique
2. Hand washing technique
3. Bacterial growth
4. Isolation for pure culture
5. Bacterial Identification
6. Identification of worms, Protozoans and fungi.
7. Pre and post lab record keeping

## Student Assessment Tools:

The above student learning objectives will be generally assessed or evaluated by instructors using a variety of **assessment instruments** including **lecture exams, laboratory exams, quizzes, laboratory reports, written reports, presentations, projects, etc.** The decisions concerning the type or types and number of instruments that are used in a specific section of the course will be left to the instructor of that section. This information, when given by the instructor should be recorded by the student in the **Student Assessment Section** of this document.

## Course Content

### Lecture Topics:

#### Week 1

- Chapter 1 - The Microbial World and You
- Chapter 2 - Begin Chemical Principles

#### Week 2

- Chap. 2,3, - Chemical Principles

#### Week 3

- Chapter 4 - Functional Anatomy of Prokaryotic and Eukaryotic Cells
- Chapter 5 - Micro Metabolism

#### Week 4

- Chapter 5 - Microbial Metabolism
- Chapter 6,7 - Microbial Growth, Control of Microbial Growth

#### Week 5

- Chapter 7 - Control of Microbial Growth
- Chapter 8 - Microbial Genetics

#### Week 6

- Chapter 9 - Recombinant DNA and Biotechnology (Applications of Genetic Engineering)
- Chapter 13 - Viruses

#### Week 7

- Chapter 10 - Classification of Microorganisms
- Chapter 11&12 - Overview of Bacteria, Fungi, Algae, Protozoans, Multicellular Parasites

#### Week 8

- Chapter 14 - Principles of Disease and Epidemiology
- Chapter 15 - Mechanisms of Pathogenicity
- Chapter 19 - Disorders Associated with Immune System

#### Week 9

- Chapter 16 - Nonspecific Defenses of the Host
- Chapter 17 - Specific Defenses of the Host: The Immune Response

#### Week 10

- Chapter 18 - Practical Applications of Immunology
- Chapter 20 - Antimicrobial Drugs

#### Week 11

- \*Chap. 21-22 - Microorganisms and Human Disease

#### Week 12 + 13

- \*Chap. 23-24 - Microorganisms and Human Disease

#### Week 14

- Chap.25,26,28 - Applied and Industrial Microbiology

#### Week 15

- **FINAL EXAMS**

\*Specific diseases discussed based on the professor's discretion

**Laboratory attendance is mandatory; health related issues should be addressed with a doctor.**

**All lab books must be new and unused.**

**All students must wear protective eye wear, vinyl gloves and laboratory coats**

**No handheld devices are allowed at student work benches.**

**Laboratory Schedule:**

| Week         | Lab Title  | Exercise Number |
|--------------|--|-----------------|
| 1            | Intro. To the Lab                                  | 1               |
|              | Dental Caries                                      | 21              |
|              | Prep. and care of stock cultures and aseptic tech. | 5               |
|              | Cultural Characteristics Of Bacteria               | 4               |
| 2            | Microscope and its use                             | 2               |
|              | Microscopic measurements                           | 3**             |
|              | Smear Prep   | 7               |
|              | Capsule Stain                                      | (10)**          |
|              | Negative Stain                                     | (6)**           |
| Simple Stain | (8)**  |                 |
| 3            | Smear prep   | 7               |
|              | Gram Stain   | 9               |
|              | Spore Stain  | 10**            |
|              | Acid-Fast Stain                                    | 11**            |
| 4            | Isolating pure cultures                            | 14              |
|              | <u>Staphylococci</u>                               | 18              |
|              | <u>Streptococci</u>                                | 19              |
|              | <u>Motility</u>                                    | 12              |
|              | Working with Media                                 | (13)**          |
| 5            | Differential and Selective Media                   | 17              |
|              | Media  | 9               |
|              | Gram Stain   |                 |
| 6            | Bacteria on the skin                               | 22              |
|              | Bacteria in Water                                  | 24              |
|              | Effect of Temperature on Growth                    | 32              |
|              | Effect of Ultraviolet Light                        | 33              |
| 7            | Fungi  | 36              |
|              | Protozoans   | 37              |
|              | Parasitic Worm Infections                          | 38              |

|    |  |               |
|----|--|---------------|
| 8  | Unknown Bacteria<br>Gram Stain                           | 28<br>9       |
| 9  | Knowns   | 29, 30, 31    |
| 10 | Unknowns<br>Read Known Results                           | 29, 30, 31    |
| 11 | Read Unknown Results                                     | 29, 30, 31    |
| 12 | Antimicrobics<br>Effect of Antiseptics And Disinfectants | 34<br>35      |
| 13 | Turn in Unknown<br>Read lab 34 and 35<br>Gram Stain      | 29, 30, 31, 9 |
| 14 | Lab Practical**  |               |
| 15 | Lab final and final Gram Stain**                         |               |

\*\* Professor's Discretion

\*Additional Labs may include the following:

Bacterial Population Counts - Lab 15  
 Bacterial Population Counts – Lab 25  
 Bacteria in Food – Lab 26  
 Yogurt making  
 Wine making (to demonstrate fermentation only)  
 Temperature and Its Effect on Microbial Growth - Exercise 34  
 Enterotubes - Exercise 53  
 Spoiled Canned Foods - Exercise 70  
 Bacteria in the soil - Handout  
 Microscopic View of Milk - Exercise 67

Cultures used in lab are:

*Staphylococcus aureus*  
*Serratia marcescens*  
*Proteus vulgaris*  
*Klebsiella pneumonia*  
*Enterococcus faecalis*  
*Bacillus subtilis*  
*Bacillus sterothermophilus*  
*Saccharomyces cerevisias*

*Staphylococcus epidermidis*  
*Pseudomonas aeruginosa*  
*Micrococcus luteus*  
*Escherichia coli*  
*Enterobacter aerogenes*  
*Bacillus megaterium*  
*Pseudomonas fluorescens*

**Student Assessment:**

|             |    |  |                    |
|-------------|----|--|--------------------|
| Lecture:    | 1. | Lecture test . . . . .                     | ____%              |
|             | 2. | Comprehensive Final Examination . . . . .  | ____%              |
|             | 3. | Research Project/presentation . . . . .    | ____%              |
|             | 4. | Lecture quizzes . . . . .                  | ____%              |
| Laboratory: | 1. | Midterm Exam (written) . . . . .           | ____%              |
|             | 2. | Final Exam (written) . . . . .             | ____%              |
|             | 3. | Laboratory Practical Exam . . . . .        | ____%              |
|             | 4. | Pre and Post Laboratory notebook . . . . . | ____%              |
|             | 5. | Laboratory Unknown . . . . .               | ____%              |
|             | 6. | Lab quizzes . . . . .                      | ____%              |
|             | 7. | Observation                                |                    |
|             |    | <b>TOTAL . . . . .</b>                     | <b><u>100%</u></b> |

**If you have a medical condition or develop a medical condition during this semester, which prevents you from fulfilling the requirements of this course, you must notify your physician. You and your physician must decide whether or not it is appropriate for you to remain in this course. If the decision is to remain in this course, please obtain a letter from your physician indicating that your continued participation in this course is appropriate and present it to the Department Chair.**

**Faculty Addenda: As per individual faculty member**

**Lecture Attendance:** As per instructor;

**Lab Attendance:** As per instructor;

**Policy Concerning Late Assignments:** As per instructor;

**Policy Concerning Make-Up Testing:** As per instructor;

**Safety Information:** As per instructor and assigned exercise;

## College Policies:

### Student Responsibility

Students will be held responsible for reading all pertinent information in college publications regarding withdrawals, course drops, college deadlines, and tuition refunds. Students are responsible for compliance with the rules and regulations as stated in college publications.

### Absence of Instructor

Students are expected to wait twenty minutes for a faculty member to come to class. If at the end of twenty minutes, the faculty member does not come, the students should sign an attendance sheet, which indicates the course, date, and time. A student should deliver the attendance sheet to the divisional office (A304) if between 9:00 a.m. and 5:00 p.m. or to the Evening Office (C107) if before 9:00 a.m. or after 5:00 p.m. Students cannot be penalized by faculty for not waiting longer than twenty minutes.

### Academic Dishonesty and Plagiarism

Bergen Community College is committed to academic integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception. Students are responsible for their own work. Faculty and academic support services staff will take appropriate measures to discourage academic dishonesty. **Plagiarism** is a form of academic dishonesty and may be a violation of U.S. Copyright laws. Plagiarism is defined as the act of taking someone else's words, opinions, or ideas and claiming them as one's own.

#### Consequences of Violations Academic Integrity

##### A. Instructor's Sanctions for a Violation

The faculty member will determine the course of action to be followed. This may include:

- Assigning a failing grade on the assignment;
- Assigning a lower final course grade;
- Failing the student in the course
- Other penalties appropriate to the violation;

In all cases, the instructor shall notify the Vice President of Student Services of the violation and the penalty imposed. The student has the right to appeal the decision of the instructor to the appropriate department head.

##### B. Institutional Sanctions for Violations

When a violation of academic integrity has been reported regarding a student, the Vice President of Student Services may impose disciplinary penalties beyond those imposed by the course instructor, which may include suspension or dismissal from the College. The student shall have the right to a hearing before the Vice President of Student Services or a designated judicial affairs committee. Judicial procedures governing violations of academic integrity are contained in the student handbook.

### Class Attendance

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

### Eating and Drinking

Eating or drinking in classrooms, lecture rooms, laboratories, gymnasium, swimming pool, or passageways is forbidden. Covered beverages only are permitted in the library. Eating and drinking are permitted in cafeteria and vending areas only.

### Learning Assistance

#### Henry and Edith Cerullo Learning Assistance Center

The Tutoring Center, English Language Resource Center, Math Walk-In Center and Writing Center are collectively

known as the Henry and Edith Cerullo Learning Assistance Center. The Cerullo Learning Assistance Center is located in the Pitkin Education Building, in Room L-125. The telephone number is (201) 447-7489. The Learning Assistance Center, staffed with peer and professional tutors, offers free individual and group tutoring, supplemental instruction, and online tutoring for subjects offered at the College. The Center provides alternative approaches to problem solving and organizational skills. Tutors help clarify classroom lectures and textbooks and help students prepare for exams. These services build student self-confidence and reduce fear of failure. The Center is equipped with the latest technology and software, including tapes, books, review sheets, exercises and software.

### **Services for Students with Disabilities**

*Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at [ossinfo@bergen.edu](mailto:ossinfo@bergen.edu) for assistance.*

### **Sidney Silverman Library**

Main Building, Pitkin Education Center, L-wing, 2nd Floor.

Paramus Library Hours: (201) 447-7131 or visit <http://www.bergen.edu/library/calendar/gcal.htm>

Paramus Service Desk: (201) 447-7970

Meadowlands Location: 1280 Wall Street, Lyndhurst 2nd Floor

Meadowlands Library Hours: <http://www.bergen.edu/library/calendar/gcal.htm>

Meadowlands Service Desk: (201) 301-9692

[www.bergen.edu/library](http://www.bergen.edu/library)

### **Testing Services**

The Bergen Community College Office of Testing Services (OTS) is located in Room S-127. OTS serves the college community by identifying, developing, procuring, administering, processing, and/or evaluating examinations, which meet a variety of administrative and instructional needs. To contact the OTS, please call (201) 447-7202. The Office of Testing Services administers makeup tests as a service for students who, for compelling and exceptional reasons, have missed a scheduled classroom examination. Students must receive prior permission from and make arrangements with their course instructors to take these examinations, under specific conditions, in the Office of Testing Services, Room S-127.

### **WebAdvisor**

WebAdvisor is a web interface that allows students to access information contained in Datatel's Colleague, the administrative database used by Bergen Community College. Students may use WebAdvisor to register for classes, to pay tuition and fees, to view their class schedules, to check grades, to check on progress toward degree requirements, etc. WebAdvisor accounts are available for all students enrolled in credit programs. New students are strongly encouraged to attend an in-person registration or advisement session before using a WebAdvisor account. Eligible students without WebAdvisor user names and passwords may access their WebAdvisor account by going to [go.bergen.edu](http://go.bergen.edu) and selecting "I'm new to WebAdvisor." Then, follow the on-screen directions. Check the WebAdvisor FAQ for answers to common questions, such as how to reset your password. Students must have a valid e-mail address on file with the College to use WebAdvisor