

**LAST REVIEW: 2009-10**

*(i.e. 2003-2004)*

**NEXT REVIEW: 2014-15**

*(i.e. 2008-2009)*

**STATUS: A**

*(A, I, D)*

**COURSE TITLE: General Microbiology Laboratory**

**COMMON COURSE NUMBER: MCB3020L**

**CREDIT HOURS: 1.0**

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS:**

*(Voc. Course ONLY)*

Lecture:

Lab: **48.0**

Clinic:

Other:

**PREREQUISITE(S): BSC1010, BSC1010L, BSC1011, BSC1011L, CHM1045, CHM1045L, CHM1046, CHM1046L**

**COREQUISITE(S): MCB3020**

**PRE/COREQUISITE(S):**

**COURSE DESCRIPTION:** This laboratory course will complement lecture topics and include the application of fundamental techniques used in the isolation, cultivation and identification of microorganisms and viruses.

## **UNIT TITLES**

- 1. Microscopy and Bacterial Staining Techniques**
- 2. Culture Techniques**
- 3. Survey of Microorganisms Other Than Bacteria**
- 4. The Spread and Control of Microorganisms**
- 5. Environmental Microbiology**

**EVALUATION:**

Students performance will be assessed through lab reports, quizzes and practical and written exams.

*\*\*\* Complete the following only if course is seeking general education status \*\*\**

**GENERAL EDUCATION Competencies and Skills \*:**

Please highlight in **green** font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

<b>1. Read with critical comprehension</b>	
<b>2. Speak and listen effectively</b>	
<b>3. Write clearly and coherently</b>	
<b>4. Think creatively, logically, critically, and reflectively</b> (analyze, synthesize, apply, and evaluate)	
<b>5. Demonstrate and apply literacy in its various forms:</b> (highlight in <b>green ALL</b> that apply) ( 1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental )	
<b>6. Apply problem solving techniques to real-world experiences</b>	
<b>7. Apply methods of scientific inquiry</b>	
<b>8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings</b>	
<b>9. Demonstrate an understanding of and appreciation for human diversities and commonalities</b>	
<b>10. Collaborate with others to achieve common goals.</b>	
<b>11. Research, synthesize and produce original work</b>	
<b>12. Practice ethical behavior</b>	
<b>13. Demonstrate self-direction and self motivation</b>	
<b>14. Assume responsibility for and understand the impact of personal behaviors on self and society</b>	
<b>15. Contribute to the welfare of the community</b>	

*\* General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*

**Common Course Number:**

## **UNITS**

### **Unit 1 Microscopy and Bacterial Staining Techniques**

#### **General Outcome:**

- 1.0 The student shall:** The students should be able to correctly use and care for the microscope and describe procedures for simple and differential staining techniques.

#### **Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 1.1** Operate the light microscope correctly in order to accurately observe both living and dead microorganisms.
- 1.2** Define and explain resolution, parfocal, working distance and magnification.
- 1.3** Be able to prepare a bacterial smear.
- 1.4** Determine bacterial morphology using various staining techniques.
- 1.5** Complete the steps of the Gram stain to correctly identify gram-positive and gram-negative bacteria.
- 1.6** Demonstrate the correct procedure for performing the acid-fast stain technique.
- 1.7** Identify bacterial spores and capsules using differential staining procedures.

**Common Course Number:**

**Unit 2 Culture Techniques**

**General Outcome:**

**2.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 2.1 List and demonstrate the steps in performing aseptic technique.
- 2.2 Perform streak plate and pour plate techniques for the pure culturing of bacteria from a mixed population.
- 2.3 Distinguish specific and distinctive culture characteristics needed to help identify a bacterial species.
- 2.4 Demonstrate the use of a colony counter.
- 2.5 Explain the procedure and purpose of making serial dilutions.
- 2.6 Explain what is meant by enriched, selective and differential media and how they are used.
- 2.7 Perform a series of biochemical tests and interpret the outcomes of those tests as diagnostic tools used in bacterial species identification.
- 2.8 Demonstrate the use of a spectrophotometer in measuring cell density.

**Common Course Number:**

**Unit 3 Survey of Microorganisms Other Than Bacteria**

**General Outcome:**

**3.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 3.1** Distinguish the structure of viruses from microorganisms.
- 3.2** Detect the presence of replicating bacteriophages through cell lysis and plaque formation.
- 3.3** Compare and contrast yeast and mold morphology, growth and reproduction.
- 3.4** Test for the presence of yeast metabolism through enzyme activity.
- 3.5** Describe the major characteristics of various protozoa.
- 3.6** Describe the characteristics of various pathogenic flatworms and roundworms.

**Common Course Number:**

**Unit 4 The Spread and Control of Microorganisms**

**General Outcome:**

**4.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 4.1** Assess the effects of heat and other physical agents on bacterial growth.
- 4.2** Determine the susceptibility of bacteria to various antiseptics and disinfectants.
- 4.3** Evaluate the effectiveness of disinfectants on inanimate objects.
- 4.4** Evaluate the effectiveness of antiseptics on the skin surface.

**Common Course Number:**

**Unit 5 Environmental Microbiology**

**General Outcome:**

**5.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

- 5.1 Assess the role of salt and other preservatives in food preservation.
- 5.2 Perform a standard plate count and coliform plate count of food and dairy products.
- 5.3 Explain the importance of the fermentation process to the food and beverage industry.
- 5.4 Demonstrate the role of microorganisms in the production of yogurt and other foods.
- 5.5 Complete the required tests utilized to detect coliform bacteria in water.
- 5.6 Explain what a biofilm is and be able to cite examples found in the environment.
- 5.7 Perform an examination of soil bacteria from legume root nodules.
- 5.8 Carry out testing for bacterial ammonification.
- 5.9 Isolate bacteria from soil and assess their capability in producing antibiotics.
- 5.10 Carry out a plate count of soil bacteria.
- 5.11 Analyze the changing patterns of microbial succession in a Winogradsky column.
- 5.12 Assess the ability of soil bacteria to recycle carbon, nitrogen and other nutrients.

**Common Course Number:**

**Unit 6**

**General Outcome:**

**6.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 7**

**General Outcome:**

**7.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 8**

**General Outcome:**

**8.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 9**

**General Outcome:**

**9.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 10**

**General Outcome:**

**10.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 11**

**General Outcome:**

**11.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 12**

**General Outcome:**

**12.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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**Common Course Number:**

**Unit 13**

**General Outcome:**

**13.0 The student shall:**

**Specific Measurable Learning Outcomes:**

**Upon successful completion of this unit, the student shall be able to:**

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