

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

COMMON COURSE NUMBER: MCB3020

CREDIT HOURS: 3.0

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture: 48 Lab:

Clinic: Other:

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

COREQUISITE(S): MCB3020L

PRE/COREQUISITE(S):

COURSE DESCRIPTION: This course is designed to introduce the science educator to structure, nutrition and growth of microorganisms; characteristics of representative microorganisms and viruses; metabolic properties and introduction to microbial genetics, pathogenicity, ecology and industrial applications of microorganisms.

UNIT TITLES

1. Basic Principles of Microbiology
2. Growth and Metabolism
3. Genetics
4. Microorganisms and Viruses
5. Mechanisms of Disease
6. Food and Environmental Microbiology

EVALUATION:

Assessment will be based on homework, quizzes, exams and/or projects.

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

GENERAL EDUCATION Competencies and Skills*:

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

15. Contribute to the welfare of the community	
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** General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*

Common Course Number: MCB3020

UNITS

Unit 1 Basic Principles of Microbiology

General Outcome:

1.0 The student shall:

Specific Measurable Learning Outcomes:

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

- 1.1 Describe the main characteristics of microorganisms and viruses.**
- 1.2 Explain the importance of microorganisms.**
- 1.3 Differentiate between the major groups of microorganisms and viruses.**
- 1.4 Explain the Germ Theory of Disease.**
- 1.5 Describe the major contributions in microbiology.**
- 1.6 Define cell and compare and contrast prokaryotic and eukaryotic cells.**
- 1.7 Become familiar with the various types of microscopes and their uses.**

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Unit 2 Microbial Growth and Metabolism

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 Define microbial growth

2.2 Compare and contrast reproduction in prokaryotes and eukaryotes.

2.3 Describe the major chemical and physical factors that affect microbial growth.

2.4 Explain the differences between the various nutritional methods found among microorganisms.

2.5 Describe the various media used to cultivate microorganisms in the laboratory.

2.6 Describe cellular respiration.

2.7 Describe fermentation and compare it to cellular respiration.

2.8 Define metabolism.

2.9 Describe the process of protein synthesis.

2.10 Explain how lipids and proteins can be used by microbes to produce energy.

2.11 Explain the factors that influence the effectiveness of antimicrobial agents.

2.12 List and describe various physical and chemical agents of microbial growth.

2.13 Explain how antimicrobial drugs work

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Unit 3 Microbial Genetics

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 Become familiar with basic genetic terminology.**
- 3.2 Describe the structure of DNA.**
- 3.3 Explain the differences between prokaryotic and eukaryotic DNA.**
- 3.4 Describe the major mutations that can occur and the consequences of these mutations.**
- 3.5 Describe the chemical and physical agents that can adversely affect DNA.**
- 3.6 Describe how an operon can regulate microbial genes and protein synthesis.**
- 3.7 Define genetic recombination and describe the three processes used by bacteria to transfer DNA from one organism to another.**
- 3.8 Explain the importance of recombinant DNA technology and its practical applications.**
- 3.9 Describe the process of gene cloning.**
- 3.10 Explain some of the concerns of genetic engineering.**

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Unit 4 Microorganisms and Viruses

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 Define taxonomy.

4.2 Describe the domains and kingdoms of living things and give examples of each.

4.3 Define binomial nomenclature and cite examples.

4.4 Describe how microorganisms are classified including cell type, morphology, metabolism and reproduction.

4.5 Become familiar with the major groupings of bacteria including gram-positive and negative, acid-fast and spore-formers.

4.6 Compare and contrast the two major groups of Protista.

4.7 Describe the four groups of protozoans based on motility and cite examples of each.

4.8 Describe the four groups of fungi based on sexual reproduction and cite examples of each.

4.9 Describe the basic structure of a virus.

4.10 Explain the steps of viral replication.

4.11 Describe how viruses are cultured in the laboratory.

4.12 Describe viroids and prions.

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Unit 5 Mechanisms of Disease

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 Define disease, virulence and pathogen.

5.2 Define opportunist.

5.3 Describe the factors involved in disease.

5.4 Describe the mechanisms of virulence.

5.5 Explain antimicrobial resistance in microbes and ways in which it can occur.

5.6 Define epidemiology.

5.7 Describe the most common reservoirs of human disease.

5.8 Describe the major routes of transmission of human disease.

5.9 Explain the steps in Koch's Postulates.

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Unit 6 Food and Environmental Microbiology

General Outcome:

6.0 The student shall:

Specific Measurable Learning Outcomes:

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

- 6.1 Explain the role of microorganisms in food production.**
- 6.2 Explain how fermentation is utilized in the food industry.**
- 6.3 Explain how food spoilage occurs and how it may be prevented.**
- 6.4 Describe industrial fermentations and their uses.**
- 6.5 Define microbial ecology.**
- 6.6 Describe the various symbiotic relationships found in nature.**
- 6.7 Describe the various habitats in which microorganisms reside and the environmental conditions presented by each.**
- 6.8 Explain the role of microbes in the cycling of nutrients.**
- 6.9 Describe the steps in the nitrogen cycle.**

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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