

BLINN COLLEGE  
MASTER COURSE SYLLABUS

BIOLOGY 2421

CIP # 26.0503.51 03

CIP Area: Life Sciences

Fall, 2005

Prepared by:

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Bryan Campus / Date

Confirmed by:

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Division Chair, Brenham Campus / Date

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Division Chair, Bryan Campus / Date

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Brenham Academic Dean / Date

## **Biol 2421 Microbiology**

This course is in the core curriculum.

### **Purpose Statement**

The purpose of the natural sciences component in the core curriculum is to enable the student to understand the basic concepts in the natural sciences and to apply that understanding to the analysis of current issues in society. Microbiology is a preparatory course for students pursuing degrees in nursing, medical technology, radiology, physical therapy, and kinesiology as well as those students pursuing pre-professional degrees in medicine or veterinary medicine.

### **Course Description**

An introduction to the study of bacteria and other microorganisms. Topics include fundamentals of microbiology, microbial control, microbiology in everyday life, infection and host resistance and pathogenic organisms. Laboratory is devoted to various culturing and staining techniques.

**Prerequisite:** Biol. 1406 or approval of the division chair. Chem. 1407 is recommended. Three class hours and three laboratory hours per week. Additional out-of-lab hours may be required.

Credit: Four semester hours.

#### **1. Expanded Course Description**

A. The major areas which will be covered in lecture are:

- 1) History of Microbiology
- 2) Bacterial Growth and Culture
- 3) Bacterial morphology
- 4) Enzymes and energy storage
- 5) Bacterial nutrition and metabolism
- 6) Bacterial genetics
- 7) Viruses
- 8) Viral and bacterial infectious diseases
- 9) Fungi, protozoa, multicellular organisms, and parasitic diseases caused by these organisms
- 10) Physical and chemical control of microorganisms
- 11) Antimicrobial agents in therapy
- 12) Microbiology of soil, water, and air
- 13) Microbiology of food
- 14) Infection and host resistance

B. The major areas which will be covered in lab are:

- 1) Safety Orientation
- 2) Use of equipment necessary for a microbiology laboratory
- 3) Basic microbiological techniques necessary for the culture and observation of bacteria
- 4) Effects of selected chemicals on bacterial growth
- 5) Preparation and utilization of bacterial stains
- 6) Selected physiological reactions of bacteria
- 7) Microbiological techniques used in medical bacteriology
- 8) Selected serological tests
- 9) Unknown identification

2. **Classroom hours:** Three lecture hours and three laboratory hours per week.
3. **Credit hours:** Biol 2421 earns four credit hours.
4. **Prerequisite:** Biol 1406 or 1413. Chem 1407 is recommended.
3. **Core Course:** This is a Core Course in the 42-hour Core of Blinn College; more can be found at [www.blinn.edu/corecurriculum/](http://www.blinn.edu/corecurriculum/). As such, students will develop proficiency in the appropriate Intellectual Competencies, Exemplary Educational Objectives, and Perspectives, as follows:
  - A. Intellectual Competencies
    - 1) **Reading:** The ability to analyze and interpret a variety of printed materials, books, documents and articles – above the 12<sup>th</sup> grade level.
    - 2) **Writing:** The ability to produce clear, correct and coherent prose adapted to purpose, occasion and audience - above the 12<sup>th</sup> grade level.
    - 3) **Listening:** The ability to analyze and interpret various forms of spoken communication, possess sufficient literacy skills of writing, reading – above 12<sup>th</sup> grade level.
    - 4) **Critical Thinking:** The ability to think and analyze at a critical level.
    - 5) **Computer Literacy:** The ability to understand our technological society, use computer-based technology in communications, solving problems, acquiring information.
  - B. Exemplary Educational Objectives
    - 1) Understand and apply method and appropriate technology to the study of natural sciences.
    - 2) Recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
    - 3) Identify and recognize the differences among competing scientific theories.
    - 4) Demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
    - 5) Demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.
  - C. Perspectives
    - 1) Stimulate a capacity to discuss and reflect upon individual, political, economic, and social aspects of life in order to understand ways in which to be a responsible member of society
    - 2) Recognize the importance of maintaining health and wellness.
    - 3) Develop a capacity to use knowledge of how science and technology affect their lives.
    - 4) Develop personal values for ethical behavior.
    - 5) Use logical reasoning in problem solving.
    - 6) Integrate knowledge and understand the interrelationships of the scholarly disciplines.

## **Course Objectives and Student Learning Outcomes**

These learning outcomes will include demonstrated competence in the course objectives listed below:

Lecture Objectives: Attain a working knowledge of the following areas

- 1) History of Microbiology
- 2) Bacterial Growth and Culture
- 3) Bacterial morphology
- 4) Enzymes and energy storage
- 5) Bacterial nutrition and metabolism
- 6) Bacterial genetics
- 7) Viruses
- 8) Viral and bacterial infectious diseases
- 9) Fungi, protozoa, multicellular organisms, and parasitic diseases caused by these organisms
- 10) Physical and chemical control of microorganisms
- 11) Antimicrobial agents in therapy
- 12) Microbiology of soil, water, and air
- 13) Microbiology of food
- 14) Infection and host resistance

Lab Objectives: Attain a working knowledge of the following areas

- 1) Safety Orientation
- 2) Use of equipment necessary for a microbiology laboratory
- 3) Basic microbiological techniques necessary for the culture and observation of bacteria
- 4) Effects of selected chemicals on bacterial growth
- 5) Preparation and utilization of bacterial stains
- 6) Selected physiological reactions of bacteria
- 7) Microbiological techniques used in medical bacteriology
- 8) Selected serological tests
- 9) Pure and Mixed Unknown identifications

## Course Requirements

Upon completion of the course, the student will have an overall average of  $\geq 60\%$  of the combined lecture and laboratory components of the course. This includes at least 3 major exams and a comprehensive final exam. The student will demonstrate in the laboratory an understanding of the experiment through analysis of the data and the ability to use this data to solve problems and predict the outcome of analogous reactions and/or experiments.

## Grading System

The following areas will be clearly outlined by the Instructor in the Course Information Sheet given to the students in the first week of the semester:

1. Major Exams: At least three major exams evenly distributed throughout the semester covering the lecture material.
2. Laboratory: At least two laboratory practical exams. Identifying at least two unknown organisms, one of which should be mixed using laboratory techniques developed in the laboratory. May be included on major exams or the instructor may give quizzes covering lab material or a laboratory final exam.
3. Minor Exams/Quizzes/Homework: Given at the discretion of the instructor.
4. Additional Reports or projects: Given at the discretion of the instructor.
5. Final Exam: Comprehensive exam covering the entire course required of all instructors.

## Outcomes Inventory

Biol 2421 will be evaluated through the following methods:

1. A pre- and post-test instrument is used to determine the extent of improvement the class has gained during the semester.
2. Each Intellectual Competency listed above will be evaluated to measure its attainment:
  - a. To measure **reading**:
    1. Exam or quiz over assigned textbook readings or
    2. Lab assignment or exam or quiz over lab book readings or
    3. Written assignment or exam over assigned journal articles.
  - b. To measure **writing**:
    1. Written assignment or term paper or
    2. Essay question on exam.
  - c. To measure **listening**:
    1. Exam or quiz over lecture material or
    2. Quiz over video viewed.
  - d. To measure **critical thinking**:
    1. Lab assignment or exam or quiz involving problem solving.
  - e. To measure **computer literacy**:
    1. Quiz over Internet/CD-Rom/DVD activities.

## **Calendar**

The instructor will ensure that the course content is covered in a manner that fulfills the course objectives. The instructor will also provide Course Information Sheets to the students and the administration during the first week of the semester. Important details including tentative examination dates and due dates for assignments are provided.

### **Week**

### **Lecture Topic**

1. Introduction/History of Microbiology
2. Light Microscopy
3. A Survey of Microorganisms, Taxonomy, Nomenclature, Anatomy of Bacteria
4. Bacterial Reproduction and Growth, Intermicrobial Relationships
5. Bacterial Metabolism: Enzymes/ Energy and ATP, Catabolism/Anabolism
6. Bacterial Genetics
7. Immunology
8. Airborne Diseases
9. Foodborne and Waterborne Diseases
10. Soilborne and Arthropodborne Diseases
11. Sexually Transmitted, Contact & Miscellaneous Bacterial Diseases
12. The Fungi
13. The Protozoa
14. Multicellular parasites
15. Viruses

### **Week**

### **Laboratory Topic**

1. Safety, Effect of Disinfectants and Antiseptics
2. Sterilization of Media and Equipment, Ubiquity of Microorganisms, Taxonomy, Nomenclature, Anatomy of Bacteria
3. Aseptic Transfer of Microbes, Aseptic Use of a Serological Pipette, Loop-inoculated Pour Plate
4. Quebec Colony Counter, Streaking for isolation
5. Preparing Slides, Various staining techniques
6. Cultural Characteristics of Bacteria, Selective and Differential Media
7. Selective and differential media for Gram + organisms
8. Selective and differential media for Gram + organisms
9. Selective and differential media for Gram – organisms
10. Selective and differential media for Gram – organisms
11. Hand out unknowns #1 & 2
12. Fungi, Continue unknowns #1 & 2
13. Protozoans, Turn in lab report on unknown #1 & 2, Hand out unknowns #3 & 4
14. Platyhelminthes, Nematodes, Continue unknowns #3 & 4
15. Continue unknowns #3 & 4
16. Turn in lab report on unknown #3 & 4

**Materials:**

Required:

Lecture Materials: Bryan and Brenham Campuses:

*Fundamentals of Microbiology*, 6ed., I. E. Alcamo, Jones and Bartlett Publ., 2001.

Laboratory Materials: Bryan and Brenham Campuses:

*Microbiology in Practice*, 6ed., Lois Beishir, Addison Wesley Longman, Inc., 1996; lab coat, microscope slides, bacteriological inoculation loop and needle, plastic storage box.

Recommended: Bryan and Brenham Campuses:

*A Photographic Atlas for the Microbiology Laboratory*, 2ed., M.J. Leboffe and B.E. Pierce, Morton Publishing Co., 1999.

*Solenopsis Software, Biology With A Bite*, Greg Phillips, 1999