

**BTC 181**  
**Basic Lab Techniques**

**COURSE DESCRIPTION:**

Prerequisites: ENG 090, MAT 060, and RED 090, or satisfactory score on placement test

Corequisites: None

This course introduces the basic skills and knowledge necessary in a biological or chemical laboratory. Emphasis is on good manufacturing practices, safety, solution preparation, and equipment operation and maintenance following standard operating procedures. Upon completion, students should be able to prepare and perform basic laboratory procedures using labware, solutions, and equipment. Hours Per Week: Class, 3. Lab, 3. Semester Hours Credit, 4.

**COURSE OBJECTIVES:**

Upon completion of this course, the student will demonstrate basic knowledge of the following:

- A. Use of the metric system
- B. Performance of basic lab math
- C. Safe laboratory conduct and use of equipment
- D. Scientific terminology
- E. Sterile technique
- F. Preparation of Solutions
- G. Sampling Techniques
- H. Separation Techniques
- I. Spectroscopy
- J. Regulation
- K. Quality control

**OUTLINE OF INSTRUCTION:**

- I. Introduction to Biotechnology
  - A. Overview of curriculum content
  - B. Review of Career Opportunities
  - C. Survey of Biotechnology Techniques
  - D. Examples of Biotechnology Applications
- II. Safety in the Workplace
  - A. Introduction to Lab Safety
    - 1. Safety working with chemicals
    - 2. Safety working with biological materials
  - B. Overview of Regulatory Agencies
  - C. Personal Responsibilities in the Lab
- III. Sterile Techniques
  - A. Preparation of sterile media
  - B. Sterilization techniques

- IV. Descriptions of Data
  - A. Terminology
  - B. Describing data
  - C. Evaluating data statistically
  - D. Collection of meaningful data
  
- V. Lab Math
  - A. Exponents and Scientific notation
  - B. Logarithms
  - C. Units of measurements
  - D. Ratios and Proportions
  - E. Percents
  - F. Concentration and dilutions
  - G. Graphs and linear relationships
  - H. Graphs and exponential relationships
  - I. Unit Conversions
  
- VI. Preparation of Solutions
  - A. Concentration expressions
  - B. Calculations
  - C. Dilutions
  - D. Water purification systems
  
- VII. Measurement Techniques
  - A. Volumetric Analysis
    - 1. Use of pipetting devices
    - 2. Volumetric glassware
  - B. Mass measurement
    - 1. Properties of balances
    - 2. Survey of types of balances
    - 3. Calibration
  - C. Length measurement
  - D. Temperature
    - 1. Temperature scales
    - 2. Types of thermometers
  - E. pH
    - 1. Definition of pH
    - 2. PH indicators
    - 3. PH meters
    - 4. Analysis of concentration by titration
  - F. Light
    - 1. Electromagnetic spectrum
      - a. Interactions of light with matter
    - 2. Spectrophotometers
      - a. Types of spectrophotometers
      - b. Use of spectrophotometers

- VIII. Separation Techniques
  - A. Filtration
    - 1. Principles of filtration
    - 2. Types of filtration and filters
    - 3. Filtration systems
  - B. Centrifugation
    - 1. Principles and Instrumentation
    - 2. Modes of Centrifugation
    - 3. Safe operation
  - C. Chromatography
  - D. Electrophoresis
  
- IX. Regulation of Medical and Food Products
  - A. Regulatory issues
  - B. Regulation of pharmaceuticals
  - C. Regulation of food and agriculture
  - D. Regulatory agencies
  
- X. Quality Control
  - A. Quality systems in different work places
  - B. Documentation
  - C. Good Manufacturing Practices
  - D. Good Laboratory Practices

**REQUIRED TEXTBOOKS:**

Seidman, L. A., and Moore, C. J. Basic Laboratory Methods for Biotechnology: Textbook and Laboratory Reference. 1<sup>st</sup> ed. Upper Saddle River: Prentice Hall, Inc., 2000.

**SUGGESTED OF REFERENCES, PERIODICALS, AND VISUAL AIDS:**

Numerous supplementary texts, programmed materials, and audiovisual packages are available in the Educational Resources Center. These materials may be utilized to reinforce the lecture and lab material for independent study by the student.

**STATEMENT FOR STUDENTS WITH DISABILITIES:**

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.