

**Common Course Outline**  
**BIOL 254**  
**Techniques of Biotechnology II**  
**5 Semester Hours**

**The Community College of Baltimore County**

**Description**

**Techniques in Biotechnology II**

Presents theory and practice of advanced biotechnology laboratory procedures including protein production, purification and analysis; includes general laboratory management techniques including laboratory safety and record keeping with emphasis on methods development and scientific communication. BIOL 254 meets for two lecture hours and 9 laboratory hours per week. Requires Program director signature.

**Overall Course Objectives**

This course is the second of a two-part course intended to prepare students for an entry level position in a biotechnology or bioscience laboratory. Basic lab management skills as well as specialized techniques in protein expression, purification and analysis, immunocytochemistry, immunolabeling, chromatography, cell culture, and fermentation will be used to complete an authentic research project in association with an industry or academic laboratory. Students will also expand the quality control plan and laboratory standard operating procedure started in BIOL 253 and will continue to maintain written documents according to industry standards. Students will present their research both orally and in writing to a team of advisors.

Upon successful completion of this course, the student will be able to:

1. Isolate and purify protein by affinity chromatography, dialysis, immunoprecipitation, and polyacrylamide gel electrophoresis.
2. Characterize proteins using chromatography, immunolabeling, polyacrylamide gel electrophoresis, protease digestion and Western blots.
3. Maintain tissue culture cell lines and transfect eukaryotic tissue culture cells with plasmid DNA.
4. Prepare stock solutions and reagents.
5. Design a controlled experiment, troubleshoot methods and equipment, and collect data accurately.
6. Analyze data and report research findings orally and in writing.
7. Maintain laboratory records, standard operating procedures, and equipment maintenance log.
8. Order and properly store supplies.

9. Demonstrate an understanding of the theory of column, paper, thin-layer and gas chromatography as well as high performance liquid chromatography.
10. Use bioinformatics to utilize genomic databases, BLAST technology, and analyze nucleotide and amino acid sequences.

### **Major Topics**

1. Protein Purification
  - Protein preparation
  - Affinity chromatography
  - Dialysis
  - Gradient Centrifugation
2. Protein Analysis
  - SDS Polyacrylamide Gel Electrophoresis
  - Western Blots
  - Gas Chromatography
  - Protease Analysis
  - Functional Analysis of Proteins
  - Protein Quantitation
3. Cell Culture
  - Cell Line Maintenance
  - Transfecting Tissue Culture Cells
4. Immunocytochemistry and Immunolabeling
5. Reporter Proteins/Protein Activity
  - Lac Operon
  - Trp Operon
  - Luciferase
  - B-Galactosidase
  - Lowry/Bradford Assays
6. Fermentation
  - Batch Culture Fermentation
  - Large Batch Fermentation
7. Chromatography
  - Affinity/Column Chromatography
  - Gas Chromatography
  - Liquid Chromatography
  - Thin-Layer Chromatography
  - Immunoprecipitation
8. Industry Procedures
  - Packaging
  - Quality Control
  - Tracking
9. Communication
  - Oral and Written Communication with Peers and Scientists

Scientific Writing  
Literature Search  
Written Presentation of Data

### **Course Requirements**

*Prerequisites:* BIOL 251 (which may be taken concurrently) with an earned grade of “C” or better.

*Grading/exams:* Grading procedures will be determined by the individual faculty member but may include exams, quizzes, laboratory notebook, laboratory reports, reading assignments, presentations and laboratory projects.

### **Other Course Information**

Individual faculty members who teach this course may include additional course objectives and topics or exclude some of these course objectives and topics. It is expected that a majority of these topics will be covered.

Date Revised: 3/30/00