

TEXTBOOKS

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METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

- I. Biomanufacturing processes
 - A. Safety
 - B. Documentation
 - C. Aseptic techniques
- II. Biomanufacturing tools
 - A. Bioreactor
 - B. Chromatography techniques
 - C. Cell culture
- III. Genetic engineering techniques
- IV. Maintaining equipment and instruments

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Work in compliance with Environmental Health & Safety (EHS)
 1. Wear appropriate personal protective equipment (PPE)
 2. Identify unsafe conditions and take corrective actions
 3. Access and utilize MSDS
 4. Assists with waste treatment operations
- B. Work in compliance with current Good Manufacturing Practices (cGMPs)
 1. Follow Standard Operation Procedures (SOPs) for all operations
 2. Prepare required documentation for recording and notification of events and changes related to equipment maintenance logs and calibration
 3. Maintain equipment log books
 4. Control and receive parts and materials
 5. Maintain training documentation
 6. Maintain equipment and process utilities in a validated state
 7. Properly label lab items (Solutions, plates, tubes etc.)

- C. Culture of microorganisms using bioreactor/Flasks
- i) Prepare and autoclave culture media
 - ii) Setup and use the bioreactor/flasks to grow microorganisms
 - iii) Observe the exponential growth of microorganisms in a bioreactor/flasks
 - iv) Utilize log functions and graphs to analyze microbial growth.
 - v) Utilize OD, and pH to monitor growth in a bioreactor.
- D. Understand and carry out adherent mammalian cell culture
- i) Setup incubator and biosafety cabinet for cell culture
 - ii) Culture and maintain adherent mammalian cells
 - iii) Perform methods of cell thawing, cell counting, sub-culturing and cryopreservation
 - iv) Cell lysis, extraction of protein/RNA and determination of their concentration
 - v) Cell staining techniques
- E. Separate, identify and purify components of a biological sample
- i) Setup and perform paper chromatography/column chromatography/gas chromatography/HPLC
 - ii) Filtration
 - iii) Agarose gel electrophoresis
 - iv) Poly-acrylamide gel electrophoresis (PAGE)
- F. Perform genetic engineering techniques
- i) Extraction of plasmids from bacterial cells
 - ii) Restriction digestion of lambda phage DNA and analysis through agarose gel electrophoresis
 - iii) Transformation of *E.Coli*, transfection, Luciferase assay
 - iv) PCR amplification of various genes (e.g 16s rDNA, GAPDH)
 - v) Fermentation lab
 - vi) Antigen/Antibody interaction (ELISA)
 - vii) Basic bioinformatics tools

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

College Catalog

<https://www.kckcc.edu/academics/catalog/index.html>

College Policies and Statements

<https://www.kckcc.edu/about/policies-statements/index.html>

Accessibility and Accommodations

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.