University of Management & Technology
School of Science
Department of Life Sciences

Advanced Research Methods

Lecture Schedule	Thursday 06:30pm-9:30pm	**Semester**	Spring 2020
Pre-requisite	BS Biochemistry / Biotechnology	**Credit Hours**	3
Instructor(s)	Dr Mohammad Perwaiz Iqbal	**Contact Moodle link**	
Office		**Office Hours**	Displayed on office door

Objectives

The objectives of this course are to:

- Introduce the students to various Advanced Research Methods in Biochemistry
- Introduce to the students – principles, methodology and applications of various biochemical techniques
- To provide the students with sufficient understanding and knowledge of various biochemical techniques so that they could apply these to answer various research questions pertaining to biological sciences.

Expected Outcomes

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

- Explain the basic principles, methodology and applications of various biochemical techniques commonly used in graduate level research.
- Describe the techniques pertaining to identification, isolation, characterization of various mammalian cells and biomolecules and their applications in life sciences.

Text book & Reference book(s)

1. Introduction to Biochemistry & Biotechnology Techniques. Fatima Akram (editor) 2018. Paramount Books (Pvt) Ltd., Karachi.
2. Biotechnology-A Laboratory Course. Becker JM, Coldwell GA, Zachgo EA, 1990, Academic Press, New York.

Grading Policy

Examination based on MCQs and SAQs

Quizez (Continuous Assessment)	25%
Midterm:	25%
Final:	50%

Course Schedule

Week	Lecture #	TOPICS	CH
1	1	• Principles of safe working in the lab • Introduction to pH, buffers, dilutions and definitions.	
2	1	• Sterilization techniques • Establishing a pure culture, growth in a culture medium and construction of growth curves.	
3	1	• Centrifugation techniques. • Fractionation of cells by differential centrifugation and identification.. • Density gradient centrifugation.	
4	1	• Spectrophotometry • Types and applications • Determination of Km and Vmax of an enzyme using spectrophotometry	
5		• Discussion on papers using above mentioned techniques	
6	1	• Techniques for sample preparation (dialysis, lyphilization, ultrafiltration) • Determination of small quantities of protein in a biological sample using various methods - Lowry method, Biuret method and Bradford method.	
7	1	• Purification of a protein/enzyme from mammalian liver using salting out, ion exchange chromatography, affinity chromatography and High-Performance Liquid Chromatography (HPLC) • Characterization of enzyme protein by gel filtration and isoelectric focusing techniques	
8	1	• Determination of purity of a protein using disc gel electrophoresis. • Determination of molecular mass by SDS-Polyacrylamide Gel Electrophoresis (SDS-PAGE) • Two-dimensional isoelectric focusing and SDS-PAGE)	
9		• Discussion on papers using above mentioned techniques • Mid term exam	
10	1	• Conventional production of polyclonal antibodies. • Enzyme-linked Immunosorbent Assay and applications	

11	1	• Production of monoclonal antibodies by hybridoma technique. • Purification, characterization and applications of monoclonal antibodies.	
12	1	• Immuno-histochemical techniques such as Immunofluorescence. • Fluorescence Activated Cell Sorting (FACS) technique and applications.	
13		• Discussion on papers using above mentioned techniques.	
14	1	• Isolation of DNA from blood cells, purification and quantitation on agarose gel. • DNA finger printing.	
15	1	• Blotting techniques (Southern, Northern and Western) and applications.	
16	1	• Gene polymorphism, Polymerase Chain Reaction (PCR) and Restriction Fragment Length Polymorphism (RFLP) and applications.	
17	1	Final Examination	