UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
BISC-512	Bioanalytical and Diagnostics Technology	7.5
Prerequisites	**Department**	**Semester**
None	Life Sciences	Fall
Type of Course	**Field**	**Language of Instruction**
Required (Core)	Biomedical Sciences	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr. Christos Papaneophytou Dr. Lefteris Zacharia	1st
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

This course is designed to offer students an in-depth understanding of foundational techniques, coupled with advanced molecular and proteomic tools, critical for state-of-the-art research and diagnostic approaches in biomedical sciences. Upon successful completion, students should be able to:

- Understand and illustrate how fundamental scientific principles and inherent molecules have been leveraged to create products tailored for analytical technology applications.
- Recognize and explain how biological processes, pave the way for cutting-edge bioanalytical techniques essential in genomic and proteomic research.
- Delve into the scientific underpinnings of contemporary instrumentation, highlighting the capabilities and potential of database technology in enhancing analytical precision.
- Acquire a comprehensive understanding of current automated diagnostic methods, emphasizing their relevance and application in modern clinical settings.
- Develop the skill to systematically review and critically assess scientific literature, shedding light on present-day practices, innovations, and breakthroughs in technologies employed in biosciences.

Learning Outcomes:

After completion of the course, students are expected to be able to:

1. Discuss the major categories of laboratory-related chemical and biotechnology tools and account for their application in the Analysis of biological samples.
2. Describe the function of basic analytical instruments and their principles in the isolation, Analysis, and characterization of cells, molecules, reactions, and molecular interactions.
3. Relate biotechnology products, and applications to the physicochemical properties of biological macromolecules to be diagnosed/isolated.
4. Appraise the appropriateness of a specific biotechnology application/system for molecular, cellular, or whole tissue level identification/isolation.
5. Appraise the potential of analytical technology tools and data-based technology in disease diagnosis
6. Review critically scientific literature and report on current practices in the relevant fields of analytical technology for biological samples

Course Content:

1. Separation and Analysis of Biological Materials
2. Spectroscopic Techniques
3. Fluorescence and Chemiluminescence Principles and Technology
4. Enzyme assay: Types, Kinetics, Inhibition
5. Separation and Analysis of Biological Materials (Electrophoresis)
6. Separation and Analysis of Biological Materials (Chromatography, Spectroscopy)
7. Automated DNA sequencing, in situ hybridization, DNA microarray
8. Molecular Techniques
9. Proteomics: Protein purification and Characterization, Protein Sequencing Strategies
10. Fluorescence and Electron Microscopy
11. Monoclonal antibody production and uses in diagnosis and treatment of diseases

Learning Activities and Teaching Methods:

Lectures; presentations, and discussions of biotechnology examples from the scientific literature. Cooperative learning. Demonstration: Familiarization with data/graphs of experimental output; video presentations of technological applications and analytical instruments.

Assessment Methods:

Assignment, Midterm, and Final Exams

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Principles and techniques of Biochemistry and Molecular Biology, 8th ed.	K. Wilson, J. Walker	Cambridge University Press	2018	**ISBN** 978-1-107-16227-3
Understanding Bioanalytical Chemistry: Principles and Applications	V. A. Gault, N.H. McClenaghan	Willey	2015	978-1118684894 e-book

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Instrumentation in Life Sciences	P. S. Bisen, A. Sharma	CRC Press	2012	ISBN-10: 1466512407 ISBN-13: 978-1466512405