

COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
ACADEMIC UNIT	BIOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	BIO_MEA	SEMESTER	6-8
COURSE TITLE	INSTRUMENTAL ANALYSIS OF BIOMOLECULES		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
	Lectures	3	3
COURSE TYPE	Scientific Field		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek and English in case that foreign students participate		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	No		

2. LEARNING OUTCOMES

Learning outcomes
By the completion of the course the students should: <ul style="list-style-type: none"> • Have a good understanding of the biochemical, physicochemical, crystallographic, immunological, and recombinant DNA techniques that are analyzed in the course and an understanding of their theoretical background. • Know which of these technics should be used in order to answer scientific questions.
General Competences
By the completion of the course the student should gain: <ul style="list-style-type: none"> • The ability to critically read scientific papers that use the above techniques. • The ability to start research in fields that use the above techniques. • The competence to teach High School students. • The aptitude to continue their graduate studies in Biomedical Sciences.

3. SYLLABUS

UV-Vis Spectrophotometry. Fluorescence, Chemiluminescence, Phosphorescence. IR Spectroscopy. Atomic Absorption, Atomic Emission and Atomic Fluorescence Spectrometry. Mass Spectrometry. Thin layer Chromatography, Column Chromatography (gel permeation, ion-exchange, adsorption, affinity), HPLC (types and methodology), Horizontal electrophoresis (cellulose acetate and agarose), Vertical electrophoresis in polyacrylamide gels, Isoelectric focusing, Two-dimensional electrophoresis, Analytical and Preparative Ultracentrifugation. Crystallization methods of Biological macromolecules. Introduction in computational biology: Scattering of electromagnetic radiation, X-ray diffraction, crystal symmetry, point groups & space groups, introduction in Fourier transforms, structure factor, the convolution theorem and its applications, The Patterson function, the phase problem and Structure solution methodologies (MIR, MAD, molecular replacement, direct methods). Recombinant DNA technology. Flow cytometry: principles, sample preparation and staining with antibodies, data analysis using the CellQuest programme. Cr ⁵¹ -release assay for the assessment of NK cell cytotoxic activity.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Power point, e-class

TEACHING METHODS	Activity	Semester workload
	Lectures	39
	Independent study	36
	Course total	75
STUDENT PERFORMANCE EVALUATION	<p>The student assessment language is Greek. The assessment is based on final written exams (50%) and paper analysis (50%). Foreign students can take the exams in English. The students are informed about the assessment criteria during the first day of class.</p> <p>Grading scale: 1-10 Passing grade: 5</p>	

5. ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- Protein Crystallization, Second Edition, edited by Terese Bergfors, IUL Biotechnology Series
- Fundamentals of Crystallography, C. Giacovazzo, H.L. Monaco, G. Artioli, D. Viterbo, G. Ferraris, G. Gilli, G. Zanotti, M. Catti, Edited by C. Giacovazzo, International Union of Crystallography (IUCr), Oxford Science Publications
- Gene Cloning and DNA Analysis: An Introduction, Brown T.A., Edited by John Wiley & Sons, Ltd., Publication, 7th edition.
- Recombinant DNA: Genes and Genomes - A Short Course, Watson J.D., Caudy A.A., Myers R.M., Witkowski J.A., Edited by New York: W.H. Freeman: Cold Spring Harbor Laboratory Press, 3rd edition.
- Lippincott Illustrated Reviews: Immunology, Viselli S., Melvold R., Edited by Lippincott Williams & Wilkins, 2nd edition.
- Notes.