COURSE LAYOUT

1. GENERAL

SCHOOL	APPLIED BIOLOGY & BIOTECHNOLOGY		
DEPARTMENT	BIOTECHNOLOGY		
STUDY LEVEL	*Undergraduate*		
COURSE CODE	**218**	**SEMESTER**	6th
COURSE TITLE	BIOPHYSICS		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
LECTURES	3	3.5
PRACTICAL EXERCISES	2	1.5
TOTAL		5

COURSE TYPE	Scientific Specialization
PREREQUISITES	Physics, Biochemistry
LANGUAGE	Greek with English support in terminology
IS THE COURSE OFFERED for ERASMUS STUDENTS?	YES (in English)
COURSE WEB PAGE	https://oeclass.aua.gr/eclass/courses/BIOTECH131/

2. LEARNING OUTCOMES

Learning Outcomes

The course is a basic introductory course in Biophysics techniques used in the analysis of the structure of biomolecules (proteins, DNA, RNA) such as X-ray crystallography, scattering techniques, multidimensional NMR, molecular dynamics as well as other quantitative techniques such as calorimetry, circular dichroism and fluorescence spectroscopy. Finally, the course aims to help students understand the applications of these techniques in the design of drugs and other bioactive molecules.

Upon successful completion of this course the student will be able to
• Have an understanding the basic features of the biophysical methods
• Is capable of knowing when to use these methodologies
• Analyze and calculate basic information
• Present the results of a relevant study

General Competences

Search , analyze and synthesize data and information, and the use of essential technologies
Teamwork
Work in a multidisciplinary environment
Search , analyze and synthesize data and information, and the use of essential technologies

3. COURSE CONTENT

Theory: Review of the structure of biological macromolecules. Thermodynamics and calorimetry. Molecular Mechanics. Crystals. Crystallization. Theory of x-ray diffraction. Reciprocal space. Crystallographic symmetry. Structure factors and Intensities. Data Collection. Electron Density Function. Approaches to the Phase Problem. Structure refinement. Radiation scattering from solutions of macromolecules. Absorption & CD spectroscopy. Fluorescence spectroscopy. NMR Spectroscopy. Applications in drug design and Nanotechnology
Laboratory: Determination of thermodynamic parameters for salt dissolution, crystallization of lysozyme, diffraction experiments with lysozyme crystals, analysis of electron density map for lysozyme-ligand complex, fluorescence microscopy image processing, construction of molecular model.

4. TEACHING and LEARNING METHODS - Evaluation

TEACHING METHOD	In suitably-equipped teaching rooms
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	Use of powerpoint slides, e-crystallography simulations, videos, etc. in lectures, use of e-class website system for information, interactive training (quiz), availability of educational material, delivery & grading of exercises, assessment with tests before laboratory exercises and communication with students .
TEACHING ORGANISATION	
STUDENTS EVALUATION	I. Theory: Written final examination (100%) comprising: multiple choice questions, problem solving and short answer questions. Optional quiz exercises (30% grade) II. Laboratory: Tests before each laboratory session (15%), written assignments on the laboratory exercises (50%), final personal assignement (35%).

Activity	*Work Load*
Lectures	39
Laboratory exercises	10
Group and/or individual assignments	20
Independent study	51
12 optional weekly quiz	3
Final Exam	2
Course total (25 hours of student work loadper ECTS)	*125*

5. BIBILIOGRAPHY

1. Principles in Physical Biochemistry (van Holde, Johnson, Ho) 2nd Edition
2. Themata Moriakis Biofysikis (Hamodrakas) Symmetria publications