COURSE LAYOUT

1. GENERAL

SCHOOL	APPLIED BIOLOGY AND BIOTECHNOLOGY		
DEPARTMENT	BIOTECHNOLOGY		
STUDY LEVEL	*Undergraduate*		
COURSE CODE	**1405**	**SEMESTER**	5th
COURSE TITLE	MOLECULAR RECOGNITION		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
LECTURES	3	0,12
PRACTICAL EXERCISES	2	0,08
ESSAYS	1	0,04
TOTAL ECTS (Table 4)		5,00

COURSE TYPE	Specialization and Development of Professional Skills
PREREQUISITES	No
LANGUAGE	Greek with English support in terminology
IS THE COURSE OFFERED forERASMUS STUDENTS?	YES (in Greek)
COURSE WEB PAGE	https://mediasrv.aua.gr/eclass/courses/BIOTECH144/ http//eclass.geneticslab.gr

2. LEARNING OUTCOMES

Learning Outcomes

The course is an introduction to the interaction and molecular recognition between biomolecules.
On completion the student will be capable of:

- Have basic knowledge of the structural units forming biomolecules
- Be able to quantify biomolecular interactions and recognition
- Have knowledge of techniques and methodology used for the quantification of interactions between biomolecules
- Have knowledge of the processes and players at molecular level for chemical signal transduction
- Have knowledge of processes and methodology for drug design
- Have knowledge of protein folding mechanisms and their cellular translocation
- Using molecular modeling software on computer and construct and analyze biomolecules.
- Compiling reports and analyzing results that arise from the study of structural elements of biomolecules and enhance his/her ability for on line query of electronic libraries and scientific journals.

General Competenses

- Search, analysis and synthesis of data and information with the use of necessary technologies
- Adaptation to new conditions
- Decision making
- Group and autonomous work

- Generation of new research ideas
- Planning and Managing projects
- Advance of free, fresh and logical thinking

3. COURSE CONTENT

I. GENERAL PRINCIPLES

1. Structural elements of biomolecules (amino acids, bases, additive biomolecules, proteins, nuclear acids).
2. Types of interactions involved in recognition (qualitative and quantitative analysis).

a. Interactions between individual atoms.

b. Interactions of structural elements of molecules.

3. Energy interaction analysis.

a. Molecular Engineering

b. Molecular Dynamics.

4. Recognition levels, high fidelity recognition.

a. Definition of Molecular Recognition.

b. The contribution of individual interactions to recognition.

j. Hydrogen bonds.

ii. Electrostatic interactions.

iii. Stereotypical obstruction.

c. General internal stabilization methodology. electric cargo.

5. Protein recognition areas.

a. Grades of recognition, high fidelity recognition.
b. Size and complexity of areas of recognition.
c. Structural elements
d. The position of the substrate.

6. Size and complexity of recognition areas.

II. CHEMICAL TRANSFER TRANSPORTATION AND INTERVENTION OF CELLS

1. Common molecular mechanisms for signal transduction.

a. Mechanisms

b. Active groups.

2. Hormones, neurotransmitters, local chemical mediators.
3. Signal transmission to membranes and cytoplasm.
4. Steroid hormones and their receptors. Pheromones
5. Structure of membrane proteins. Channels and receivers.

III. APPLICATIONS IN BIOTECHNOLOGY

1. Rational drug design.
2. Creation of antibodies against viruses and bacteria.
3. Insecticides-Pesticides. Biochemical processes.
4. Explain important plant processes at the molecular level.

a. Movement of ions in plants.

b. Photosynthesis.

c. The movement in the plants.

5. Antibody design against virii and bacteria.
6.Steroid hormones and their receptors.

IV. LABORATORY: Amino acids and protein stereotypes. Molecular identification of nuclear acids. Membrane proteins. Hemoglobin. Proteolytic enzymes - Molecular action. Substrate design. The molecular action of insecticides.

4. TEACHING and LEARNING METHODS - Evaluation

TEACHING METHOD	In suitably equipped teaching rooms. Distant Learning
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	The course is completely computerised in the form of Powerpoint, Web linking, etc. Computer programmes and appilications are taught and distributed to students, for the analysis of financial information. The support of learning process and the necessary materials are facilitated by the electronic, web based e-class platform (http://geneticslab.gr).
TEACHING ORGANISATION	*Activity* / *Work Load* Lectures (direct) — 39 h Laboratory work — 26 h Group and/or individual works — 13 h Autonomous study — 47 h *Total contact hours and training* — ***125 h (5 ECTS)***
STUDENTS EVALUATION	**I.** Written final examination (40%) of different difficulty, based on the lectures offered, containing: - Questions of multiple choice. - Questions of theoretical knowledge. - Problems based on lecture material. **II.** Laboratory exercises/practicals (30%). **III.** Group and small autonomous works (20%). **IV.** Internet questions (10%)

5. BIBILIOGRAPHY

Introduction to Protein Structure (Branden&Tooze) (1991). Garland Publishing Inc,
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Biochemistry (LubertStryer) (Fourth Edition 1995) W.H.Freeman and Co.
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Βιοχημεία (Stryer) Ελληνική Μετάφραση Τομος Ι και ΙΙ (1994) Πανεπ. Εκδ. Κρήτης.
Communication within Animal Cells Greg J.Baritt , Oxford Science Pubs.1992
ISBN 0-19-854726-9
Plant Biochemistry and Molecular Biology Hans-Walter Heldt, Oxford Pubs. 1997
ISBN 0-19-850179-X
Molecular Plant Development PeterWesthoff , Oxford Pubs. 1998
ISBN 0-19-850203-6
Proteins: Form and Function (Bradshaw &Purton Eds.) (1990). Elsevier Trends Books
ISBN 1 85166 512 9
BioEnergetics (Albert Lehninger) (1973).
The Benjamin/Cummings Publishing Company ISBN 0-8053-6103-0
Chemical Communication: The Language of Pheromones (Agosta) (1992).
Life Processes of Plants (Galston) (1994).