COURSE OUTLINE

(1) GENERAL

SCHOOL	Sciences		
ACADEMIC UNIT	International Graduate Program in Biological Inorganic Chemistry		
LEVEL OF STUDIES	Graduate		
COURSE CODE	**3**	**SEMESTER**	**1**
COURSE TITLE	Biophysics of pharmaceutical action		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
		5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific field Special background Specialised general knowledge
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek / English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://bic.chem.uoi.gr/BIC-En/biophysics-en.html

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

After successfully completing the course, descriptive marker 6 of the European Qualifications Framework, students should be able to:

- know basic principles of biophysics of biomolecules and drugs
- know the effect of functional groups and stereochemistry on the biological activity of compounds
- know basic websites in order to find structural biology information
- know types of software and the principles of molecular simulation
- know basic meanings of multiparametric statistical analysis
- be aware of the basic principles governing the Quantitative Relationships Action - Structure (QSAR)

Knowledge

Protein-ligand interactions (molecular binding and molecular dynamics)
Thermodynamics of interactions (electron, steric, topological and hydrophobic parameters)
QSAR methodology

Skills
Molecular modeling
Biophysicochemical properties analysis through multi-parameter methods

Abilities
Team work and working independently
Learning opportunities for relevant computational packages

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

The general competences that students should have acquired are:
Search for, analysis and synthesis of data and information, with the use of the necessary technology
Working independently
Team work
Learning opportunities for relevant computational packages
Acquiring bibliographic research publicity skills
Acquire the appropriate theoretical base to allow further education at a doctoral level (theoretical and laboratory).

(3) SYLLABUS

1. Drug design. Introduction: Correlation of parameters (geometry, stereochemistry, bioavailability, toxicity, side effects, interactions).

2. The biophysics of the 3D structure. Structure of proteins and macromolecules. Flexibility, Wrap - Energy Paths.

3. Structural Biology. Experimental techniques (X-ray, NMR)

4. Databases. Protein Data Bank (PDB)

5. Introduction to molecular modeling. Modeling techniques and algorithms.

6. Joint compounds. Theoretical study of joint anticancer compounds and their anti-tumor mechanisms.

7. Equilibrium ratio model. Drug planning

8. Molecular dynamics of biomolecules. Protein-ligand interactions (molecular binding and molecular dynamics). Thermodynamics of interactions (electron, steric, topological and hydrophobic parameters). Force fields.

9. Meanings of multiparametric statistical analysis

10. QSAR - Drug Design. Introduction: Correlation of parameters (geometry, stereochemistry, bioavailability, toxicity, side effects, interactions).

11. Available software (demonstration and / or hands-on training)

12. Project - Presentation

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	E-mail, PowerPoint

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	*Semester workload*
Lectures	65
Essay writing	60
Individual study, preparation	70
Course total	***195***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Student evaluation is done either by presenting to a committee of teachers and a public audience or by the final written examination. The final examination includes: Multiple Choice, short-answer, open-ended, and Problem Solving Questions

(5) ATTACHED BIBLIOGRAPHY

- Molecular Biophysics for the Life Sciences Norma M. Allewell; Linda O. Narhi; Ivan Rayment Springer, 9781461485476
- Computational Biochemistry and Biophysics Oren M. Becker; Alexander D. Mackerell Jr; Benoit Roux; Masakatsu Watanabe Marcel Dekker Ltd, 082470455X
- A Primer on QSAR/QSPR Modeling: Fundamental Concepts (Springer briefs in Molecular Science) Kunal Roy; Supratik Kar; Rudra Narayan Das Springer, 9783319172804
- Statistical Modelling of Molecular Descriptors in QSAR/QSPR Matthias Dehmer; Kurt Varmuza; Danail Bonchev; Frank Emmert-Streib
Wiley-Blackwell, 9783527324347

- Related academic journals:
- Journal of Chemical Information and Modeling
- Journal of Medicinal Chemistry
- RSC Advances
- Journal of Biological Physics
- Biophysical Journal
- Biophysical Chemistry