COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED BIOLOGY AND BIOTECHNOLOGY		
ACADEMIC UNIT	BIOTECHNOLOGY		
LEVEL OF STUDIES	BACHELOR OF SCIENCE		
COURSE CODE		**SEMESTER**	9th (Summer)
COURSE TITLE	CLINICAL AND PHARMACEUTICAL BIOTECHNOLOGY		

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**
Lectures	3	0,12
Practicals (lab work)	2	0,08
Group and/or individual works	1	0,04
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 background / Skills development/ General and specialized knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in Greek)
COURSE WEBSITE (URL)	https://mediasrv.aua.gr/eclass/courses/BIOTECH167/

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 Are
Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
Guidelines for writing Learning Outcomes

This course aims at acquiring knowledge on:

1) basic modules of clinical (bio)chemistry/biotechnology

2) pathobiochemistry in relation to specific enzymes, hormones and molecular markers

3) basic modules of pharmaceutical biotechnology

4) specific proteins and enzymes of the human organism important in clinical analysis and in developing biotechnological products with social and economical impact

5) principles of drug development and production processes

6) principles of protein drug formulation and delivery

7) applications and properties of specific proteins, vaccines and therapeutic enzymes as biotechnological products

8) principles of gene therapy and stem cell technology

9) co-operation with other colleagues for creation of a study/plan, requiring the use of clinical or/and pharmaceutical biotechnology, and the ability to accessing online libraries and scientific journals

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 Adapting to new situationsDecision-making Working independently Team work Working in an international environment Working in an interdisciplinary environment Production of new research ideas

Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…

1) Retrieve, analyze and synthesize data and information using contemporary technologies.
2) Make decisions.
3) Work autonomously.
4) Work in teams.
5) Create new research ideas.
6) Advance free, creative and causative thinking.

3. SYLLABUS

Module 1: Pharmacokinetics and pharmacodynamics

1) Terms and models of pharmacokinetics and pharmacodynamics
2) Dose-response curves
3) Drug-receptor interactions and quantitative aspects
4) Pharmacodynamics mechanisms and classification
5) Drug metabolism and excretion

Module 2: Clinical biotechnology

1) Basic modules of clinical (bio)chemistry/biotechnology.
2) Pathobiochemistry and importance of enzymes, hormones and molecular markers.
3) Post-translational modifications and therapeutic proteins.
4) Molecular biology of cancer and drug design.
5) Cytokines and protein immunogenicity.
6) Growth factors and their application as therapeutics.

Module 3: Pharmaceutical Biotechnology

1) Principles of pharmaceutical biotechnology
2) Principles for development, production, formulation and delivery of biological molecules as drugs
3) Protein-engineering of therapeutic proteins
4) Properties and applications of proteins and vaccines as therapeutic biotechnological products
5) Design of recombinant hormones with therapeutic use

Module 4: Gene therapy, pharmacogenomics and bioethics

1) Gene therapy and stem-cell technology
2) Pharmacogenomics and pharmacoproteomics
3) Polymorphisms (SNPs) of drug targets and pharmacodynamics
4) Bioethics-what a scientist should be thinking
5) Intellectual property in pharmaceutical biotechnology

4. TEACHING and LEARNING METHODS – EVALUATION

5.

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face
Distant learning</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Power point presentations.
Internet platform with practice test.
Student contact electronically by email and internet platform (eclass).</td></tr>
<tr><td>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</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39 h (1.56 ECTS)</td></tr><tr><td>Laboratory work</td><td>12 h (0,48 ECTS)</td></tr><tr><td>Group and/or individual works</td><td>13 h (0.52 ECTS)</td></tr><tr><td>Autonomous study</td><td>61 h (2,44 ECTS)</td></tr><tr><td>Total contact hours and training</td><td>125 h
(5 ECTS)</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMACE 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 are accessible to students.

,</td><td>I) Written final examination (50%) 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%). A written report for every laboratory exercise is required by each student (see below).
- Each lab exercise is examined orally (during its implementation) and by a written report based on the results obtained (to be handed in before the beginning of the next exercise).
- The laboratory examination of each subject must be successful (average grade of oral and report).
- The average of the exercise grades counts 30% in the overall score of the course.

III. Group and/or individual works (20%).</td></tr>
</table>

6. ATTACHED BIBLIOGRAPHY

-***Suggested bibliography:***

1). PRINCIPLES OF CLINICAL CHEMISTRY AND MOLECULAR DIAGNOSTICS, A. Skorilas (author), *Symmeria Publications - M. Athanasopoulos - S. Athanasopoulos O.E.*, Athens 2009. (**ISBN:** 978-960-266-271-7).

2). CLINICAL BIOCHEMISTRY: METABOLIC AND CLINICAL ASPECTS, W.J. Marshall (author), *Churchill Livingstone,* 3rd edition, 2014 (**ISBN**: 978-0-7020-5140-1).

3). PHARMACEUTICAL BIOTECHNOLOGY: CONCEPTS & APPLICATIONS, G. Walsh (συγγραφέας) *Wiley Publishing Co.,* 2007, (ISBN: 978-0-470-01244-4).

- Suggested Scientific journals

1) Current pharmaceutical biotechnology
2) Nature Biotechnology
3) Journal of Pharmaceutical Sciences