COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED BIOLOGY AND BIOTECHNOLOGY		
DEPARTMENT	BIOTECHNOLOGY		
STUDY LEVEL	BACHELOR OF SCIENCE		
COURSE CODE	**3604**	**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**	**ECTS**
Lectures	3	1,56
Practicals (lab work)	2	0,48
Group and/or individual works		0,52
Autonomous study		2,44
TOTAL ECTS		**5**

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific background / Skills development/ General and specialized knowledge
PREREQUISITES:	
LANGUAGE:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEB PAGE	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 in clinical analysis and in developing biotechnological products
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 Competencies

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. COURSE CONTENT

Module 1: Introduction to pharmaceutical biotechnology

1) Principles of pharmaceutical biotechnology
2) Principles of drug design, development and production processes
3) Clinical trials
4) Regulatory affairs in drug development and production
5) Intellectual property in pharmaceutical biotechnology
6) Principles of the formulation and delivery of biological molecules as drugs
7) Principles of Pharmacokinetics
8) Drug metabolism and excretion
9) Pharmacodynamics mechanisms and classification
10) Drug-receptor interactions and quantitative aspects
11) Protein immunogenicity
12) Post-translational modifications of therapeutic proteins.
13) Protein engineering of therapeutic proteins

Module 2: Clinical biotechnology

1) Basic modules of clinical (bio)chemistry/biotechnology
2) Principles of pathobiochemistry and pathophysiology

Module 3: Therapeutic proteins and enzymes

1) Function and applications of proteins and vaccines as therapeutic products
2) Recombinant hormones
3) Hematopoietic factors in physiology and therapy
4) Cytokines, Growth factors and their application as therapeutics.
5) Therapeutic enzymes

Module 4: Gene therapy, pharmacogenomics and bioethics

1) Single nucleotide polymorphisms (SNPs) of drug targets and pharmacological outcome
2) Bioethics

4. TEACHING and LEARNING METHODS – EVALUATION

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATICS AND COMMUNICATIONS TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	Power point presentations. Discipline/subject specific software. Email and internet platform (eclass)
TEACHING ORGANISATION	

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	39 h
Laboratory work	12 h
Group and/or individual work	13 h
Autonomous study	61 h
Total contact hours and training	***125 h (5 ECTS)***

STUDENT 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.

I) Written final examination (60%), based on the lectures offered, containing:
- Multiple choice questions
- Theoretical knowledge questions
- Problems based on lecture material

II) Laboratory exercises/practical (30%). A written report for every laboratory exercise is required (see below).
- The average of the exercise grades counts 30% in the overall score of the course.

III. Group and/or individual assignments (homework) (10%).

5. 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
4) Molecular Pharmaceutics
5) International Journal of Pharmaceutics
6) Biologicals
7) Molecular Pharmacology