COURSE OUTLINE	PRACTICAL COURSE

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY AND GENETICS		
LEVEL OF STUDIES	LEVEL 7		
COURSE CODE	PHABIOTECH 4	**SEMESTER**	B
COURSE TITLE	PRACTICAL COURSE		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits. Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
	3	**15**

COURSETYPE *Background, General Knowledge, Scientific Area, Skill Development*	SCIENTIFIC AREA
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	GREEK
COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE URL	

2. LEARNING OUTCOMES

LEARNING OUTCOMES

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire upon successful completion of the course are described.
Refer to Appendix A
• Description of the Level of Learning Outcomes for each cycle of study in accordance with the Qualifications Framework of the European Higher Education Area
• Descriptive Indicators for Levels 6, 7 and 8 of the European Qualifications Framework for Lifelong Learning and Appendix B
• Guidelines for writing Learning Outcomes

Aim of the course

The aim of the course is to provide postgraduate students with the technical skills and competencies required for the technologies employed in Pharmaceutical Biotechnology. The course includes a series of computational exercises designed to familiarize students with tools and bioinformatics methods used in the development of biopharmaceutical products. Concurrently, postgraduate students have the opportunity to acquire practical skills and expertise in a range of methodologies introduced in the course Methodology, Technology & Soft Skills in Pharmaceutical Biotechnology.

Upon successful completion of the course, the postgraduate students will:

- Utilize computational tools for the analysis of biotechnological data and drug discovery.
- Apply systems biology approaches to understand the function of biological systems and develop new therapies.
- Understand the design of drugs using computational methods, leveraging structural biology data.
- Employ virtual reality tools for drug design and the simulation of cell culture techniques.

- Implement various experimental techniques, such as the creation of recombinant plasmids, bacterial transformation and protein expression in *E. coli*, next-generation sequencing, microbiome analysis, *etc*.
- Understand the fundamental principles of functional product development and perform small-scale microorganism cultures.
- Apply protein purification techniques and DNA isolation for the genotyping of pharmacogenomic variants.

GENERAL SKILLS

Considering the general competencies that the graduate should have acquired (as outlined in the Diploma Supplement and presented below), which of these skills does the course aim to achieve?

Search, analysis and synthesis of data and information, ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking and self-reflection
Promoting free, creative and inductive reasoning

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3. COURSE CONTENT

1. Computational tools for biotechnology research
2. Bioinformatics in drug discovery
3. Systems biology approaches
4. Computer-aided drug design
5. Structure-based drug design
6. Receptor-based drug design
7. Virtual reality tools: a) 3D structure-based drug design, b) Cell culture techniques
8. Recombinant plasmids and bacterial transformation
9. Protein expression and purification in *E. coli*
10. Gene editing experiments with CRISPR-Cas9
11. Basic fermentation principles: small-scale microbial culture
12. Processing techniques: protein purification
13. DNA extraction and genotyping using NGS for pharmacogenomic variations
14. Metagenomics and bioinformatics analysis

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	The teaching includes face-to-face classes, group work, case studies and/or flipped classroom approaches, combined with lectures delivered through synchronous distance learning methods. In addition to attending lectures, postgraduate students are expected to study the relevant literature and participate in educational activities.

USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)

Use of ICT in Teaching, in Laboratory Education, in Communication with students

Use of ICT in Teaching and in Communication with students.
On the asynchronous e-learning platform:

- course material is made available
- supporting resources for assignments are provided
- students submit their assignments

TEACHING ORGANIZATION

The ways and methods of teaching are described in detail.
Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research& analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. etc.
The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.

Avtivity	*Workload/Semester*
Courses	39
Literature Review	210
Preparation/Implementation of educational activities	110
Assessment	10
Total workload	**379**

STUDENT EVALUATION

Description of the evaluation process

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed

Assessment Language: Greek

Assessment Method: Formative

Individual or group written assignments (25%), Laboratory activities (50%), Final Examination: Written exam (25% of the final grade).

The assessment criteria are accessible to students as they are posted on eclass.

The assessment criteria for the written assignments are as follows:

ASSESSMENT CRITERIA FOR THE WRITTEN ASSIGNMENTS	max
Introduction	15
Topic development into sections and subsections (degree of alignment with the requirements of the assignment)	40
Conclusions (summary of the work)	10
Critical thinking, use and presentation of data, hypotheses and sources (depending on the topic)	15
Proper use of bibliography and citation formatting	10
Presentation, Formatting, Composition and Spelling	10
Total	**100**

5. SUGGESTED BIBLIOGRAPHY

- The materials from the instructors' presentations.
- Original research articles and review papers published in reputable academic journals.

Selected chapters from textbooks (available in the Library of the School of Health Sciences-indicative list).

- Watson J., Witkowski J.A, Myers R.M., Caudy A.M. *Recombinant DNA.* Academic Publications 2007.
- Lehninger, A.L., Nelson, D.L., & Cox, M.M. *Principles in Biochemistry* (6th Greek ed.). Crete University Press 2015.
- Glick B.R. & Patten C.L. *Molecular Biotechnology: Principles and Applications of Recombinant DNA.* ASM Press 2022.
- Palladino M. & Thieman W. *Introduction to Biotechnology.* Pearson Education 2019.
- Renneberg R. *Biotechnology for Beginners.* Academic Press 2023.
- Lottspeich F, Engels J. *Bioanalytics.* Wiley (2018).
- Pevsner J. *Bioinformatics and Functional Genomics.* Academic Publications 2019.
- Branden C. & Tooze J. *Introduction to protein Structure.* Academic Publications 2019.
- Baldwin G., Stan G.B., Polizzi K., Freemont P.S., Kitney R.I., Dickinson R., Ellis T., Bayer T. *Synthetic Biology*. Utopia Publishing 2017.