COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Applied Biology and Biotechnology		
ACADEMIC UNIT	Biotechnology		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**3040**	**SEMESTER**	**5th**
COURSE TITLE	Bioinformatics		

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 and Practicals	5	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*	Special background
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://mediasrv.aua.gr/eclass/courses/BIOTECH140/

(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*

The course is designed to introduce the most important and basic concepts, methods, and tools used in Bioinformatics. Emphasis will be put on the understanding and utilization of these concepts and algorithms. The objective is to help the students to reach rapidly the frontier of bioinformatics and be able to use the bioinformatics tools to solve the problems on their own research.

After completing this course, the student will be able to:

- define the terms and describe the scope of Bioinformatics, Genomics, Systems Biology
- define the types and representatives of Biological Databases
- explain how PAM and BLOSUM matrices are derived and contrast their utility
- interpret dot plots and dynamic programming matrices
- understand FASTA and BLAST methods
- explain how progressive multiple alignment works
- describe PSSMs and HMMs

- explain the basis of different approaches to creating phylogenetic trees and evaluating them
- describe approaches to modeling the three-dimensional structure of proteins
- understand the principles of gene prediction methods
- describe the design of a DNA microarray experiment and the resulting data analysis techniques

After completing the lab, the student will be able to:

- search in Biological Databases and use cross-references
- perform pairwise and multiple sequence alignments at the EMBL-EBI website
- perform BLAST searches at the NCBI website
- use phylogenetic analysis computational tools
- use molecular visualization tools

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 situations
Decision-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…
…….

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Working in an interdisciplinary environment

(3) SYLLABUS

- Introduction
- Biological Databases
- Pairwise Sequence Alignment
- Similarity Search on Sequence Databases
- Multiple Sequence Alignment
- Phylogenetic Analysis
- Structural Bioinformatics
- Gene Prediction and Gene Expression

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face in the classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Lectures: Power point presentations Labs: Use of biological databases and bioinformatics software

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-

Activity	*Semester workload*
Lectures	30
Laboratory work	30
Written assignment	20
Autonomous study	45

directed study according to the principles of the ECTS		
	Course total	**125**
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.,*	I. Theory: Written Examination (40%) which includes multiple choice, short-answer questions and problem solving. Oral Presentation (10%) II. Lab: Written Examination (50%)	

(5) ATTACHED BIBLIOGRAPHY

Jonathan Pevsner, "Bioinformatics and Functional Genomics". Wiley-Blackwell (2015) ISBN: 978-1-118-58178-0
David Mount, "Bioinformatics: Sequence and Genome Analysis". Cold Spring Harbor Laboratory Press (2004) ISBN: 978-087969712-9