COURSE OUTLINE

(1) GENERAL

SCHOOL	Health Sciences		
ACADEMIC UNIT	Faculty of Medicine		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**IAY307**	**SEMESTER**	**D (4th)**
COURSE TITLE	Introduction to 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 practical exercises with PC	3	2
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, skills development
PREREQUISITE COURSES:	Basic computer skills and working knowledge of English language is recommended
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes/English
COURSE WEBSITE (URL)	https://ecourse.uoi.gr/course/view.php?id=302

(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*

Students are expected to familiarize themselves with the basic concepts of Bioinformatics and its applications in Biomedicine and Precision Medicine. Upon successful completion of the course, students should know how to:

- use major bioinformatics data and resources
- retrieve information relevant to biological and biomedical problems/questions
- evaluate, analyze and efficiently manage information retrieved from multiple sources
- implement state-of-the-art bioinformatics methods to relate sequence, structure and function of genes and proteins
- use established bioinformatics tools to predict and model gene and protein structure and function in the context of biomedical applications, such as precision medicine, functional genomics, molecular diagnostics and rational drug design

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…*
	…….

- Search for analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Working in an interdisciplinary environment
- Respect for difference and multiculturalism
- Criticism and self-criticism
- Project planning and management

(3) SYLLABUS

- Introduction to Bioinformatics: Basic concepts/applications.
- Genomics and Functional Genomics: Genome evolution-Phylogenetics-Microarray technology and contribution in molecular diagnostics, prognostics and therapy
- Genome sequencing-Next generation sequencing methodology for the identification of genetic variants and mutants and comparative analysis of gene expression levels
- Bioinformatics Data Banks: Accession and use. Data banks with biomedical information on human genes and genetic diseases-genome maps-microarray derived data-protein sequences, structures and interactions-genomic data
- Bioinformatics tools: Tools useful in searching, selecting, analyzing and visualizing bioinformatics data. Sequence alignment, analysis of transcriptomics data and genomic profiling. Prediction of structure, topology and function and modelling of biomolecules and biomolecular complexes.

Objectives:
To give students knowledge of and competence in use of bioinformatics methods central in Biomedicine. Emphasis is placed on use of relevant database and familiarization with several different systems and tools to query such databases. The course includes analysis of DNA sequences, genes and genomes, gene expression and systems biology, as well as sequence comparison, visualization and analysis of protein structures, phylogenetics and structure/function prediction methodology.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching through lectures (face-to-face interaction of the tutor with the students) (13 one-hour lectures) and practical courses with PC (13 two-hour exercises) with focus on bioinformatic analysis of genes and proteins.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Powerpoint slides and videos are used in the lectures. The powerpoint slides and videos presented, as well as complementary teaching material (links to important

research articles or related textbooks, etc.), are freely accessible to the students through the e-course system of the University of Ioannina. The e-course system is also used for updates and communication with the students on several practical aspects of the teaching process or the exams. E-mail addresses of the teaching staff are made available to students and are freely used as a means of communication. The practical exercises are implemented with the use of PC using relevant databases and software programs and tools.

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	13
Practical courses with PC	26
Course total	***30***

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.

Language of evaluation: Greek

The final grade is based on

- A final written exam with a weighted list of: short-answer questions, open-ended questions, questions requiring combination of knowledge from different chapters, questions requiring critical thinking/interpretation, and multiple-choice or double-choice (yes/no) questions (40% of the final grade)
- Individual take-home exams throughout the semester (40% of the final grade)
- A test at the PC at the end of the semester (20% of the final grade)

(5) ATTACHED BIBLIOGRAPHY

- Teaching – study material:

1. J. Pevsner, **Bioinformatics and Functional Genomics** (eudoxus: 86054818) ed. 1st/2019, Basdra Academic Editions, ISBN: 978-618-5135-17-1
2. A. M. Lesk, **Introduction to Genomics** (eudoxus: 94702956) ed. 5th engl -1st gr/2021, Utopia Publishing, ISBN: 978-618-5173-61-6
3. Additional educational material from databases, software, analysis tools can be found at the lesson e-course page: https://ecourse.uoi.gr/course/view.php?id=302