COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering, University of Patras		
ACADEMIC UNIT	Department of Computer Engineering and Informatics		
LEVEL OF STUDIES	Undergraduate Core Elective		
COURSE CODE	CEID_NE548	**SEMESTER**	EASTER
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,Recitation sections, Project	2, 2, 1	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	5	5

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge and skills development.
PREREQUISITE COURSES:	Recommended prerequisite knowledge are the courses of data structures (CEID_NE233), algorithms (CEID_NY205) and data base development (CEID_NY334) .
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Instruction may be given in English if foreign students attend course.
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes.
COURSE WEBSITE (URL)	https://www.ceid.upatras.gr/webpages/courses/cplusplus/bioinfo/index.htm https://eclass.upatras.gr/courses/CEID1047/

(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*

Learning outcomes:
At the end of this course the student should be able to:

1. present the main principles and notions of Bioinformatics,
2. understand the connection that exists between the problems in managing biological macromolecules, and techniques for managing strings
3. design and implement algorithms for string processing in order to solve biological problems,
4. understand the basic principles of computer aided drug design,
5. present the main clustering and classification algorithms as they are applied in order to solve biological problems.

At the end of the course the student will have further developed the following skills/competences:

1. ability to exhibit knowledge and understanding of the basic principles and notions of bioinformatics and string processing algorithms
2. ability to apply methodologically this knowledge and understanding in order to solve problems in bioinformatics

3. ability to cooperate with others in order to solve complex problems in the area of bioinformatics

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
Project planning and management
Production of free, creative and inductive thinking
Production of new research ideas

(3) SYLLABUS

First Part

Introduction to algorithms for efficient management and storage of strings and sequences of biological data.
Algorithms for exact pattern matching (Boyer-Moore,Knuth-Morris-Pratt,Shift-Or, Multiple Pattern Matching).
Introduction to the suffix tree and its applications
Algorithms for approximate pattern matching and string/sequence alignment .
Algorithms for searching data base sequences (FASTA, BLAST, PROSITE)

Second Part

The theoretical base of Molecular Design
Molecular Models and Biochemical Information
Structure Based Drug Deign
Open problems

Third Part

Techniques for biological data classification and clustering targeting at predicting the behavior of biological molecules.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	We use Information and Communications Technology in communicate with students. We use e_class, e_mail and forum
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*	

Activity	*Semester workload*
Lectures	60
Recitation sections	60
Projects	30
Course total	150

the principles of the ECTS	
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.*	(1) delivering and solving a set of exercises in string processing topics (30% of the total grade) , (2) composing and presenting an essay by groups of 1-2 students, concerning the critical presentation and analysis of a set of scientific papers that deals with a specific topic of the course, and an oral examination on the notes of the course (70% of the final grade)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:

1. Neil Jones, Pavel Pevzner, An Introduction to Bioinformatics Algorithms, MIT 2004.
2. Σοφία Κοσσίδα "Βιοπληροφορική, Δυνατότητες και Προοπτικές", Εκδόσεις Νέων Τεχνολογιών Μον. ΕΠΕ 2009
3. Dan Gusfield, Algorithms on Strings, Trees, and Sequences - Computer Science and Computational Biology, Cambridge University Press, 1997.
4. S. Aluru, Handbook of Computational Molecular Biology , Chapman & All/Crc Computer and Information Science Series, 2006.