GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Computer Science		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	201SBOB	**SEMESTER**	2ο
COURSE TITLE	ALGORITHMS AND DATA STRUCTURES		

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	2	5
Tutorial Exercises	1	
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*	General Background
PREREQUISITE COURSES:	Introduction in programming with C, C++
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek, English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

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 aims to familiarize students with the basic principles of analysis and operation of basic data structures and algorithms widely encountered in computer science and informatics. By attending the course, the student is expected to acquire the necessary theoretical background and skill to cope in the following tests:

More specifically, they must be able to:

- Algorithm complexity calculation.
- Use of linear lists (stack and queue).
- Management of data stored in a tree structure.
- Tree balancing.
- Use of priority and heap queues.
- Search and sort data.
- Data hashing.
- Qualitative and quantitative evaluation of search and sorting methods for data applications.
- Implementation of all the above algorithms and data structures in a development environment Python.

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, analysis and synthesis of data and information, using the necessary technologies
- Adaptation to new situations
- Promotion of free, creative and inductive thinking

SYLLABUS

I. Complexity Algorithms
II. Data Array – Array mapping functions
III. Linear Lists (Stack, Que)
IV. Linked Linear Lists
V. Trees and Applications
VI. Tree Balancing
VII. Heap
VIII. Search Algorithms
IX. Hashing Algorithms
X. Sorting Algorithms

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*	Website of the course with supporting and auxiliary material. Communication software with students through the e-class electronic platform to share course announcements, notes and exercises.
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	26x2=52
Tutorial Exercises: Selected, representative exercises are solved concerning different modules of the course.	13x2=26
Written Exams	2x1=2
Individual Study	45
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,*	**Theory** Final written exam (100%) which includes: ● Theoretical test questions ● Problem solving

other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	

ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- R. Sedgewick, "Αλγόριθμοι σε C, Μέρη 1-4: Θεμελιώδεις Έννοιες, Δομές Δεδομένων, Ταξινόμηση, Αναζήτηση", Εκδ. Κλειδάριθμος, 2006. (ΚΩΔ. 13584)
- Sartaj Sahnii, "Δομές Δεδομένων, Αλγόριθμοι και Εφαρμογές στη C++", Εκδ. Τζιόλα, Θεσς/νίκη, 2004. (ΚΩΔ. 18548971)
- R. Sedgewick, "Algorithms in C – Parts 1-4", 3rd Ed., Addison-Wesley, 1998.
- M.T. Goodrich, R. Tamassia and D.M. Mount, "Data Structures and Algorithms in C++", John Wiley & Sons, 2003

- Related academic journals:

- Algorithmica
- ACM Transactions on Algorithms
- SIAM Journal On Computing
- IEEE Transactions on Computers