COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	INFORMATICS AND COMPUTER ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE		**SEMESTER**	
COURSE TITLE	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		3	
Tutorial		1	
Laboratory		1	
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	Infrastructure, Skills Development		
PREREQUISITE COURSES:	Computer Programming		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	eclass.uniwa.gr		

(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

Upon successful completion of the course, students should:

- Have knowledge of the theoretical principles governing Data Structures and the necessity of their efficient use in an integrated application
- Have the skills to design, implement and manipulate programmatically the most important data structures and their variations, adapting them to the requirements of the problem addressed
- Have the ability to assess and exploit the relevant programming tools for data organization and management offered by contemporary as well as new programming languages, understanding the advantages and disadvantages of each language
- Have the ability to understand the needs and restrictions in data organization and management and act in a consulting role for the design of relevant solutions
- Have adequate background in order to successfully attend courses with content pertaining to advanced data structures both at the theoretical and technological level

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 Project planning and management

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	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… …….

- Individual Work
- Team Work
- Research, analyze and synthesize information and data, also with the use of necessary technologies

(3) SYLLABUS

- Introduction
- Information and Data
- Algorithms
- Arrays
- Strings
- Stacks
- Queues
- Linked Lists
- Trees
- Graphs
- B-trees and file organizations

(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	• **For teaching** • **For Laboratory Eductaion using appropriate software** • **For communication with students**
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: 39 Tutorial Exercises: 13 Laboratory Exercises: 13 Individual Study: 60 Course total (25 work load per credit unit): **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. Written final examination (80%) which includes: • Multiple Choice questions • Problem Solving • Comparative Evaluation of theory elements • Short Answer Questions II. Laboratory Exercise (20%) • Laboratory Work • Documentation/Report • Other For the successful completion a minimal 5/10 grade is required both in the written final exam as well as in the laboratory exercises The evaluation criteria are announced to students in the lecture hall and to the web page of the course (e-class)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Γαλιώτου, Ε., Κοίλιας, Χρ., Μπαρδής Γ. (2018). Δομές Δεδομένων και Οργανώσεις Αρχείων 3η εκδ,, Εκδόσεις Νέων Τεχνολογιών, Αθήνα
2. Γεωργιάδης, Λ., Νικολόπουλος, Σ., Παληός, Λ. (2015), Δομές Δεδομένων , Ελληνικά Ακαδημαϊκά Συγγράμματα και Βοηθήματα, www.kallipos.gr
3. Μανωλόπουλος, Ι., Παπαδόπουλος, Α., Τσίχλας, Κ. (2013), Θεωρία και Αλγόριθμοι Γράφων, Εκδόσεις Νέων Τεχνολογιών, Αθήνα
4. Edmonds, J. (2016), Αλγόριθμοι – Σύγχρονες Προσεγγίσεις, Εκδόσεις Κριτική, Αθήνα
5. Goodrich, M.T, Tamassia, R., Goldwasser, M.H. (2013). Data Structures and Algorithms in Python, Wiley
6. Horowitz, E., Sahni, S., Anderson-Freed, S. (2008), Fundamentals of Data Structures in C: 2nd Edition, Silicon Press.

7. Melhorn, K., Sanders, P. (2014). Αλγόριθμοι και Δομές Δεδομένων : Τα βασικά εργαλεία, Κλειδάριθμος (Algorithms and Data Structures: The Basic Toolbox, Springer , 2008)
8. Schaffer, C. (2008) A Practical Introduction to Data Structures and Algorithm Analysis 3rd Edition (Java), Prentice Hall
9. Sedgewick, R. (2005), Αλγόριθμοι σε C, Μέρη 1-4, 3η Αμερικάνικη Έκδοση, Κλειδάριθμος.

- Electronic Sources:

1. Algorithms and Data Structures, Robert Sedgewick and Kevin Wayne, Computer Science, Princeton, https://www.cs.princeton.edu/~rs/AlgsDS07/
2. Data Structures web-based learning modules, Computer Science, Virginia Tech, http://courses.cs.vt.edu/csonline/DataStructures/Lessons/
3. Stony Brook Algorithms Repository: Data Structures http://algorist.com/sections/Data_Structures.html
4. Δομές Δεδομένων, τμήμα Τμήμα Μηχανικών Η/Υ και Πληροφορικής, Παν. Ιωαννίνων, http://www.cs.uoi.gr/~loukas/courses/Data_Structures/
5. Δομές δεδομένων και αλγόριθμοι, Τμήμα Πληροφορικής, Πανεπιστήμιο Κύπρου, http://www.cs.ucy.ac.cy/courses/EPL231/