(1) GENERAL

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>CEID_NY233</th>
<th>SEMESTER</th>
<th>EASTER (4th)</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Lectures, Laboratory Exercises, Recitation sections</th>
<th>3(L)2(LE)1(RS)</th>
<th>6</th>
</tr>
</thead>
</table>

Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).

TOTAL 6

COURSE TYPE

specialised general knowledge,

PREREQUISITE COURSES:

There are no prerequisite courses. It is however recommended that students have at least a basic knowledge of Mathematics. (CEID_NY101, CEID_NY102, CEID_NY109), Algorithms (CEID_NY131) and Programming (CEID_NY205).

LANGUAGE OF INSTRUCTION and EXAMINATIONS:

Greek. Instruction may be given in English if foreign students attend the course.

IS THE COURSE OFFERED TO ERASMUS STUDENTS

YES

COURSE WEBSITE (URL)

https://mmlab.ceid.upatras.gr/el/lessons/undergraduate/95-data-structures

https://eclass.upatras.gr/courses/CEID1158/

(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

At the end of this course the student will be able:

1. to present the basic data structuring principles and the elementary data structures.
2. To design and implement data structure.
3. Apply methodologically and cooperatively data structures for solving difficult algorithmic 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 elementary data structures
2. ability to apply methodologically this knowledge in order to understand and solve difficult algorithmic problems.
3. Ability to cooperate with others in order to solve difficult programming problems using data structures

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, Project planning and management
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

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
Criticism and self-criticism
Production of free, creative and inductive thinking

(3) SYLLABUS

Searching and sorting in main memory, Bubblesort, Heapsort and analysis of its complexity, Quicksort and analysis of its complexity, sorting in secondary memory, structured data types, array, record, file, heaps and queues, priority queues, lists, trees. Linear Median algorithm. Dictionary problem, Implicit data structures, Binary search, Interpolation-sorting, , Binary Interpolation-search, Interpolation-ψάξιμο for unknown non uniform distributions. Dynamic implicit data structures, explicit data structures. balanced trees, AVL-tree, Red-Black Tree or BB-tree, BB[a] tree, Hybrid data structures , Tries, dynamic Interpolation search, interpolation search tree (IST), interpolation search tree searching. Union-find, Hashing, Hashing with chaining, time and space complexities, Open addressing, Extendible Hashing

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face-to-face, Distance learning, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td>
<td>We use Information and Communications Technology in communication with students. We use e_class, e_mail, forum. The course has a web site.</td>
</tr>
<tr>
<td>TEACHING METHODS</td>
<td>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</td>
</tr>
<tr>
<td>STUDENT PERFORMANCE EVALUATION</td>
<td>Description of the evaluation procedure</td>
</tr>
<tr>
<td>Activity</td>
<td>Semester workload</td>
</tr>
<tr>
<td>Lectures</td>
<td>90</td>
</tr>
<tr>
<td>Recitation</td>
<td>30</td>
</tr>
<tr>
<td>Project</td>
<td>60</td>
</tr>
<tr>
<td>Course total</td>
<td>180</td>
</tr>
</tbody>
</table>

(1) Written examination (70% of the final grade)
(2) Project (30% of the final grade, in groups of 1-3 students; the project grade participates only if the written examination grade is >=5).

The above holds only for students of the 4th semester. Students of larger semesters give only the written examination.
- **Suggested bibliography:**

2. Μποζάνης Παναγιώτης, Δομές Δεδομένων, 2η Έκδοση, Εκδόσεις Α. Τζιολα & Υιοι, ΑΕ 2016

- **Related academic journals:**