

COURSE UNIT DESCRIPTION

Course name:	<i>Data Structures</i>
Course Code:	IT302
Prerequisites:	Programming II
Semester:	3d (Winter/Spring)
Duration:	15 weeks
Type:	Compulsory/ Theory+Laboratory
ECTS units:	6 (Theory 4, lab 2)
Language:	Greek
Teaching Staff:	Demosthenes Stamatis

Aims and Objectives:

The course gives a general introduction to data structures and the algorithms that operate on those structures. Topics to be covered include both static and dynamically allocated data structures. The course focuses on data abstraction and object-oriented programming techniques and is currently taught in Java.

By the end of the course the students are expected to:

- have acquired a good knowledge of the fundamental data structures, and be able to use them for the implementation of well designed and efficient programs.
- have understood the notions of data abstraction and object orientation and their role in program development.

Topics (Key Contents):

Basic concepts: Data types, data structures and implementations, type checking.

Data abstraction and object oriented programming: Modules, information hiding, data encapsulation, abstract data types, classes, objects, methods, inheritance and polymorphism.

Linear data structures: Arrays, strings, stacks, queues and their array implementation, applications.

Dynamic data structures: Dynamic storage allocation, linked lists, linked stacks and queues.

Recursion: recursive algorithms, recursive data structures, recursion as a programming methodology.

Trees: Definitions and terminology, binary trees, data structures for binary trees, heaps, priority queues.

Graphs: Definitions and terminology, data structures for graphs, graph traversal.

Files: File organisation, sequential files, direct access files, hashing.

Sorting and Searching

Lab Infrastructure:

Hardware: Pentium II, 64MB RAM, 4GB HD

Software: Java (JDK *.* freeware)

Teaching Methods:

Lectures supported by transparencies (4 Hours/per week)
Laboratory Exercises (2 Hours/per week)

Assessment:

Written examination for the theoretical part,
Hands on/Oral examination for the Laboratory

Other Remarks:

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Bibliography:

- 1] Michael Goodrich & Roberto Tamassia,
Data Structures and Algorithms in Java,
4th Edition, Addison-Wesley (2006)
- 2] Robert Sedgewick,
Algorithms in Java, Parts 1-4 : Fundamentals, Data Structures,
Sorting, Searching,
3rd Edition, Addison-Wesley (2003)
- 3] Robert Lafore,
Data Structures and Algorithms in Java,
2nd Edition, SAMS (2002) Niklaus Wirth
- 4] Algorithms + Data Structures = Programs
Prentice-Hall, 1976