Course Title: Introduction to Algorithms and Data Structures

Institute/Division: Faculty of Electrical and Computer Engineering, E-1

Number of contact hours: 45
Course duration: 1 semester
ECTS: 6

Course description:
The course comprises lectures, laboratories and a project. It covers the design, analysis and implementation of basic algorithms and data structures. The topics include: Fundamentals of algorithms, data structures and analysis of algorithms. Sorting algorithms (selection sort, insertion sort, bubble sort, merge sort, quicksort, counting sort, radix sort) – implementation, analysis and comparison. Selected string matching algorithms. Elementary data structures (linked lists, stacks, queues, trees) – operations, implementation, analysis and evaluation. Binary Search Tree – properties, operations, analysis and implementation. Heap – definition, properties, operations, analysis, implementation and applications. Graphs – fundamental terms, basic representations, traversal algorithms (BFS, DFS), selected shortest path algorithms. Hash tables – main concepts, hash functions, collision problem and its resolving techniques. Basic algorithms design techniques – divide-and-conquer, greedy algorithms, dynamic programming. On completing the course students should be able to understand, implement, compare and use fundamental algorithms and data structures.

Literature:

Course type:
Lectures (20h), computer laboratories (20h) and project (5h)

Prerequisites:
C++ programming skills

Assessment method:
Project, laboratory assignments and written tests

Target group:
Students in Computer Science, Control and Electrical Eng.

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