COURSE TITLE:	**Introduction to Algorithms and Data Structures**
Institute/Division:	Department of Automation and Computer Engineering Faculty of Electrical and Computer Engineering
Course code:	E-ADS
Erasmus subject code:	0613 Software and applications development and analysis
Number of contact hours:	45
Course duration:	1 semester (Fall/Winter)
ECTS credits:	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 and use fundamental algorithms and data structures.
Course type:	Lectures (20h), Laboratory (20h), Project (5h)
Literature:	T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein: Introduction to Algorithms. *MIT Press, 2009* A. Drozdek: Data Structures and Algorithms in C++, Brooks/Cole Pub Co, 2000.
Prerequisites:	C++ programming skills (inc. pointers and classes definition and use)
Assessment method:	laboratory assignments, project and exam
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