Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Course catalogue

Programme of Module "Algoritmi e Strutture Dati"	
- Code: F0131 - Type of course unit: Compulsory (Bachelor Degree in Computer Science curriculum General) - Level of course unit: Undergraduate Degrees - Semester: 1	
Number of ects credits: (Bachelor Degree in Computer Science) 6 (workload 150 hours)	
Teachers: Guido Proietti (Guido.Proietti@univaq.it)	
1 **Course objectives**	To provide the students with competences about main data structures and algorithms, and to make them learn how to analyze the computational complexity of algorithms and problems. Finally, to develop an intuition about how to solve efficiently a computational problem.
2 **Course content and learning outcomes (dublin descriptors)**	Topics of the module include: - Algorithms and problems. Complexity analysis of an algorithm. Lower and upper bound. - Sorting algorithms: insertion-sort, selection-sort, merge-sort, quick-sort - Priority queues: binary heaps, binomial heaps, heap-sort. - The dictionary problem: searching, inserting, deleting. Hast tables and AVL trees. - Graphs: definitions, memory representations, DFS and BFS. - Elementary graph algorithms: shortest paths and minimum spanning trees. On successful completion of this module, the student should : - By the end of this module students will be able to: 1) understand the importance of designing efficient algorithms; 2) analyze the resources (space and time) needed by an algorithm; 3) known efficient algorithms for basic computational problems (sorting, searching, graph problems, etc.). - The aim is to make the student capable of abstracting models and formal algorithmic problems from real computational problems, and designing efficient algorithmic solutions. - Through the presentation and the comparison of different solutions to a given probelm, students will be guided to learn and to identify independently their most efficient solution. - The course will encourage the development of the following skills of the student: capability of formally presenting and modelling concrete problems, focusing on their main features and discarding the inessential ones. - The course aims to develop in undergraduate students competencies and abilities necessary in their future studies, especially with respect to advanced algorithmic courses.
3 **Course prerequisites**	Students have to know: - elementary data structures (array, list, …) - recursion - summation, proof by induction, calculus
4 **Teaching methodsand language**	Lectures **Language**: Italian **Reference textbooks** C. Demetrescu, I. Finocchi, G.F. Italiano, ***Algoritmi e Strutture Dati***. Ed. McGraw-Hill.
5 **Assessment methods**	The exam should be completed jointly with the lab module. It consists of: - a written and oral examination on the theory module: - a written (mandatory) and oral (optional) examination on the lab module. Both parts provides also an (optional) intermediate written examination.