Fakultät für Ingenieurwesen
Facoltà di Ingegneria
Faculty of Engineering

COURSE DESCRIPTION – ACADEMIC YEAR 2025/2026

Course title	**Data Structures and Algorithms**
Course code	76410
Scientific sector	INF/01
Degree	Bachelor in Informatics and Management of Digital Business (L-31)
Semester	1
Year	2
Credits	6
Modular	No

Total lecturing hours	40
Total lab hours	20
Attendance	Attendance is not compulsory, but strongly recommended. The lectures consist of presentations, interspersed by small exercises, and discussions with the students. The goal of the course is to enable students to develop and analyze algorithms, which is a skill that can only be acquired by training. All the material used in the lectures and labs will be published on the OLE pages of the course. Students who are unable to follow all lectures and labs are encouraged to attend at least some of them. They are also encouraged to work out all the exercises given during the lectures and the labs.
Prerequisites	• Java/C programming skills at an introductory level • Basic mathematical knowledge about sets, functions, and elementary calculus
Course page	Microsoft Teams and https://ole.unibz.it/

Specific educational objectives	The course belongs to the type "attività formative di base – informatica di base". By following this course, students will be able to formulate algorithmic problems and to recognize algorithmic problems underlying an application. They will also acquire an in-depth understanding of the standard data structures and the corresponding algorithmic techniques to solve such problems. They will recognize how certain algorithmic approaches depend on the choice of a suitable data structure and vice versa. Moreover, students will learn how to analyze whether an algorithm is correct and which time and space resources it needs. Finally, students will learn how to compare different algorithms with respect to their suitability for a given application.

Lecturer	Ivan Donadello
Contact	Office B1.5.34, Faculty of Engineering, NOI Techpark, Via Bruno Buozzi 1, ivan.donadello@unibz.it
Scientific sector of lecturer	ING-INF/05
Teaching language	Italian
Office hours	On appointment (arrange beforehand by email).

Lecturing Assistant (if any)	--
Contact LA	--
Office hours LA	On appointment (arrange beforehand by email).
List of topics	• Searching and sorting • Analysis of algorithms: correctness and complexity • Divide and conquer, recurrences • Pointers, dynamic data structures, linked lists • Abstract data types: stacks, queues, priority queues, maps • Elementary graph and tree algorithms
Teaching format	Frontal lectures and labs

Learning outcomes	Knowledge and understanding: • D1.3 - Know the basic principles of programming. • D1.6 - Know the most important data structures and their use in programming languages. Applying knowledge and understanding: • D2.2 - Ability to solve algorithmic problems using programming methods. Learning skills • D5.1 - Learning ability to undertake further studies with a high degree of autonomy.

Assessment	The assessment is based on a written final exam. The written exam consists of questions to verify knowledge, questions that assess the ability to apply knowledge acquired in the course, and small exercises.
Assessment language	Italian
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	There are no requirements for attending the final exam. In the written exam, students have to apply techniques taught in the course in a defined setting and have to develop algorithms for new problems. The algorithms developed have to be analyzed with respect to correctness and efficiency. The answers are marked according to their correctness, the suitability of the algorithms developed, and the validity and clarity of the analysis.

Required readings	Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein (CLRS), 2nd or 3rd edition University Library: ST 134 C811 Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it
Supplementary readings	Algorithms and Data Structures - The Basic Toolbox, K. Mehlhorn and P. Sanders, free download from

	http://www.mpi-inf.mpg.de/~mehlhorn/ftp/Mehlhorn-Sanders-Toolbox.pdf
Software used	Java/C compiler and debugger