Faculty of Health, Science and Technology
Computer Science

Syllabus

Data Structures and Algorithms

Course Code:	DVGB03
Course Title:	Data Structures and Algorithms *Datastrukturer och algoritmer*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
DVA (Computer Science)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2024-01-30, and is valid from the Autumn semester 2024 at Karlstad University.

Prerequisites
Programming Techniques, 7.5 ECTS credits, and Software Development Methodology, 7.5 ECTS credits, or equivalent

Learning Outcomes
Upon completion of the course, the students should be able to:
-give an account of the role of abstraction in software development and computer science,
-give an account of abstract data structures and their role in software development,
-give an account of the algorithms common in the field of computer science,
-give an account of the concepts behind the theory of complexity,
-combine and use abstract data structures as a general purpose design tool,
-apply the algorithms commonly occurring in computer science,
-apply the theory of complexity on simple algorithms and programmes, and
-write lab reports.

Content
The course covers basic data structures (sequence, list, stack, queue, tree, graph) and related applications.

The course covers a number of algorithms using the above-mentioned data structures: sorting, searching, hashing, and navigating within certain data structures, finding the shortest way between two nodes in a graph, finding the shortest way in a tree structure, detection of cycles, minimum spanning trees, strong components and spanning forests. The concept of heuristics is introduced.

The course introduces the evaluation of algorithms and basic complexity theory.

The course includes both theory and practice. Instruction is in the form of lectures and independent study (reading assignments) as well as exercises and group laboratory sessions.

Reading List
See separate document.

Examination
Assessment is based on a written exam and a laboratory task completed in groups.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades
One of the grades 5 (Pass with Distinction), 4 (Pass with some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.