Faculty of Health, Science and Technology
Computer Science

Syllabus

Software Development and Information Management

Course Code:	DVGB24
Course Title:	Software Development and Information Management *Systemutveckling och informationshantering*
Credits:	15
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 2026-02-11, and is valid from the Autumn semester 2026 at Karlstad University.

Prerequisites
Programming and data structures (15 credits). An equivalence assessment can be made.

Learning Outcomes
Upon completion of the course, students should be able to:
Module 1: Database techniques (5 credits)
1. give an overall description of the structure of a modern database system,
2. give an account of the different parts of the relational model,
3. describe how a database system deals with transactions and data storage,
4. apply different methods of database design in practice in order to construct a relational database system, and
5. implement a relational database system and use the SQL language.

Module 2: Fundamentals of software engineering (7.5 credits)
1. give an account of basic theories and concepts of software development and how these theories are applied at different stages of major programming projects,
2. handle project and code changes in teams of several developers working in major programming projects,
3. demonstrate skills in communication, planning, accountability, and meeting procedure, and
4. give an account of the ethics of software development.

Module 3: Ethics and integrity in relation to AI-based systems (2.5 credits)
1. identify threats and risks to personal privacy in IT systems using artificial intelligence (AI),
2. give an account of basic legal requirements for the use of AI in connection with personal data,
3. perform risk assessment processes for IT systems using AI,
4. select appropriate measures to manage specific privacy risks in AI-driven IT systems,
5. explain and justify the measures taken to protect privacy in machine-learning scenarios,
6. explain the concepts of privacy by design, privacy engineering, and risk assessment in relation to AI-driven systems,
7. discuss the legal and political debates surrounding the use of AI in a manner consistent with privacy, especially regarding data protection and data sharing in the European Union, and
8. present and discuss the results of AI risk assessment, particularly technical requirements and benefits, in a scientific community.

Content
Module 1 includes:

1. principles and use of general database management systems (DBMS),
2. the architecture of database systems,
3. the relational data model (data structures, relational algebra, data integrity),
4. the SQL programming language,
5. methods for database design (the E/R model, functional dependencies, normalisation),
6. storage structures for databases (indexing),
7. transaction management, and
8. Introduction to other types of databases, such as distributed and web-based databases.

Module 2 includes:
1. a series of lectures and laboratory sessions focused on theories and concepts relevant to software technology and software management,
2. a practical group project in which students apply their knowledge of software development in practice through developing and modifying existing software and codebase, and
3. written reports and oral presentations in which students present the project activities and results.

Module 3 includes:
The module covers the most relevant definitions and foundational principles in both data protection and artificial intelligence, particularly in relation to machine learning models based on personal training data. Special emphasis is placed on the various approaches to identifying and managing privacy-related risks when using artificial intelligence algorithms, as well as on the legal requirements for IT systems that incorporate AI components, such as machine learning models or large language models.
The focus is on European and Swedish legislation.

Reading List
See separate document.

Examination
Assessment is based on:
Module 1: laboratory assignments, written assignments, and an on-campus written examination.
Module 2: individual digital tests (quizzes) and group projects including written reports and assignments linked to laboratory sessions. In addition, regular weekly reports, an oral presentation, and a final report.
Module 3: an on-campus written examination.

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 VG (Pass with Distinction), G (Pass), or U (Fail) is awarded in the examination of the course. For students in Engineering, 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.