Mathematics for Software Engineering

ECTS
5

Prerequisites
The course requires mathematics corresponding to the admission requirements for the Software Engineering Programme or MATx.

Main purpose
The purpose of the course is to provide students with the fundamental mathematical knowledge and analytical skills required for technical IT tasks, specifically within software engineering. The course supports the competency profile of the programme by enabling students to:

- Analyse and abstract mathematical problems relevant to software engineering.
- Communicate knowledge clearly and precisely.
- Formalize statements logically and computationally.
- Develop analytical problem-solving skills applicable to software development contexts.

After completing the course, students will have a strong foundational understanding of essential mathematical concepts, as well as enhanced analytical capabilities directly applicable to software engineering tasks.

Knowledge
Upon completion, students will have knowledge of:

- Fundamental arithmetic operations, numerical representations, and conversions between decimal, binary, and hexadecimal number systems.
- Basic set theory and its application in structuring data and logical relations.
- Core principles of probability theory and descriptive statistics relevant to software engineering tasks.
- Linear algebra concepts including vectors, matrices, linear equations and matrix algebra
- Basic principles of differentiation and gradients relevant to optimization and computational problems.

Skills
Upon completion, students will be skilled in:

- Converting between numerical systems (binary, hexadecimal, decimal) for computational tasks.
- Applying set theory in structuring logical and computational problems.
- Calculating probabilities and interpreting descriptive statistics to analyse data distributions relevant in software contexts.
- Solving linear equations, manipulating vectors and matrices, and applying linear algebra techniques to computational tasks.
- Differentiating simple functions and calculating gradients to support optimization in software engineering.

Competences
Upon completion, students will be competent in:

- Identifying, formulating, and solving mathematical problems relevant to software engineering analytically and systematically.
- Utilizing mathematical and statistical techniques to analyse data and support decision-making in software development.
- Integrating mathematical methods into software engineering processes, enabling effective collaboration on complex, real-world IT projects.

Topics
Arithmetic, Number systems, Set theory, Probability, Descriptive statistics, Linear algebra, Matrices, Differentiation, Gradients.

Teaching methods and study activities
The course duration is 12 weeks. The total workload for the student is estimated at 130 hours. The teaching method is classroom instruction with theory review combined with problem-solving. It is expected that the student will read the assigned literature and solve problems between the theoretic lessons and in the tutorial sessions.

Exam
Exam prerequisites:
1. Attendance (≥ 75%)

If the exam prerequisite is not met, the student must submit a written assignment in WISEflow to qualify for re-exam.

Type of exam:
Written exam, 4 hours, in WISEflow using FLOWlock
Internal assessment.

Tools allowed:
Students are allowed to use any notes, books, and other written or printed materials. Students may also access PDF files stored locally on their laptop and use a personal calculator.
However, internet access is strictly prohibited.

Re-exam:
Re-exams may be oral.

Grading criteria
Grading according to the 7-point grading scale.

Responsible
Mette Bjerg (memo)

Valid from
01-08-2026

Course type
Compulsory for Software Engineering, 1. semester