HALMSTAD UNIVERSITY
Phone +46 35 16 71 00 - www.hh.se
School of Information Technology

Engineering Mathematics 7.5 credits

Teknisk matematik 7.5 hp

Second cycle
Specialised study: second cycle, has only first-cycle course/s as entry requirements (A1N)
Syllabus is adopted by the Research and Education Board (2022-02-24) and is valid for students admitted for the autumn semester 2023.

Placement in the Academic System

The course is included as a compulsory course in the Master's Programme in Embedded and Intelligent Systems 120 credits and in the Master's Programme in Information Technology 120 credits. The course is also offered as a freestanding course.

Prerequisites and Conditions of Admission

Courses in computer science, computer engineering or electrical engineering of at least 90 credits. Courses in mathematics of at least 30 credits or courses including calculus, linear algebra and transform methods.

Course Objectives

The aim of the course is for the student to become acquainted with the mathematical and statistical concepts and methods that constitute the theoretical background of computer technology and AI. Furthermore, the student is going to develop a conceptual understanding of methodology of higher mathematics and how it can be applied to the participant's areas of specialization.
Following successful completion of the course the student should be able to:

Knowledge and understanding

- list main objects of function analysis and linear algebra and explain their properties and relations between them
- describe basic numerical methods for differentiation, integration, and optimization and discuss differences between them
- analyze working procedures and properties of statistical inference of random processes

Skills and ability

- relate concepts in function calculus and linear algebra to elements of data processing and physical systems modelling
- implement basic numerical methods for solving engineering problems
- establish a sampling interval with a given probability of aliasing and demonstrate the use of linear filters and statistical inference for weakly stationary random processes

Judgement and approach

- choose adequate methods for solving engineering problems and identify their advantages and limitations
- be able to discern the reasonableness of the outcome of combinatorial/statistical calculations

Primary Contents

The course covers basics in multivariable calculus (gradient, divergence rotor), matrix algebra (4 fundamental spaces, eigenvalues and eigenvectors, spectral decomposition), theory of function spaces (Lebesgue measure, norm estimates), numerical methods for differential and integral analysis and statistical interference of random processes.

Teaching Formats

The teaching is given in form of lectures, seminars, exercise classes and project supervision.

The teaching is conducted in English.

Examination

The overall grades of Fail, 3, 4 or 5 will be awarded for the course.
The examination consists of a written exam and a project assignment.

Name of the test		Grading
Written Examination	6 credits	U/3/4/5
Project Assignment	1,5 credits	U/G

If there are special reasons, the examiner may make exceptions from the specified examination format and allow a student to be examined in another way. Special reasons can e.g. be a decision on learning support.

For elite sports students according to Riktlinjer för kombinationen studier och elitidrott vid Högskolan i Halmstad, DNR: L 2018/177, the examiner has the right to decide on an adapted examination component or let the student complete the examination in an alternative way.

Course Evaluation

Course evaluation is part of the course. This evaluation should offer guidance in the future development and planning of the course. Course evaluations should be documented and made available to the students.

Course Literature and Other Study Resources

James, Glyn. *Advanced modern engineering mathematics*, 4th edition, Prentice Hall.

Complementary handouts.