



Course syllabus

Faculty of Technology

Department of Mathematics

2MA401 Ordinära differentialekvationer, 7,5 högskolepoäng

Ordinary Differential Equations, 7.5 credits

Main field of study

Mathematics

Subject Group

Mathematics

Level of classification

First Level

Progression

G2F

Date of Ratification

Approved 2014-10-03

Revised 2021-11-26 by Faculty of Technology. Prerequisites are revised.

The course syllabus is valid from autumn semester 2022

Prerequisites

A course package containing 60 credits mathematics. This package must contain 1MA465/1MA906 Multivariable Calculus and Vector Calculus, 7.5 credits and 1MA907 Linear Algebra Advanced Course, 5 credits or equivalent.

Objectives

After completing the course, the student should be able to

- solve problems, perform calculations, and conduct lines of reasoning within the part of mathematics that is covered by the course, and to communicate these solutions, calculations, and reasonings in writing
- identify and formulate problems within the field of the course and carry out exercises within given time limits
- present and discuss results, orally as well as in writing, in accordance to an established scientific and mathematical practice.

Content

Theorems about existence and uniqueness. Systems of first order linear differential equations, homogeneous and non-homogeneous. Fundamental matrices. Stability and classification of critical points for autonomous systems. Liapunov functions. Periodicity and limit cycles. Something about difference equations and chaotic systems.

Type of Instruction

Lectures and seminars. Compulsory assignments may be given during the course.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The student's knowledge is assessed in the form of a written exam and written and oral presentation of a project work.

Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customised exam or to have the student conduct the exam in an alternative way.

Course Evaluation

During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Credit Overlap

The course cannot be included in a degree along with the following courses of which the content fully, or partly, corresponds to the content of this course: 2MA101 Ordinary Differential Equations, 7.5 credits

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Required reading

Hirsch MW, Smale S, Devaney R. *Differential Equations, Dynamical Systems, and an Introduction to Chaos*, 3rd Edition, 2013, ISBN 978-0-12-382010-5, 418 pages.

Supplementary literature

Diacu, F, *An Introduction to Differential Equations, Order and Chaos*, 2000, W. H. Freeman and Company, ISBN 0-7167-3296-3, 399 pages