



## 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 2017-06-15 by Faculty of Technology.

The course syllabus is valid from autumn semester 2017

### **Prerequisites**

A course package containing 60hp mathematics. This package must contain IMA451 Linear algebra and Fourier series, 7.5 credits and IMA453 Vector analysis, 7.5 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.

### Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

### 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