Ordinary Differential Equations and Dynamical Systems

Programme course

6 credits

Ordinära differentialekvationer och dynamiska system

TATA71

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Mathematics, Applied Mathematics

Course level
First cycle

Advancement level
G2X

Course offered for
- Energy-Environment-Management
- Mechanical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mathematics, Bachelor´s Programme

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Linear Algebra, Calculus one variable, Calculus several variables (or their equivalent).

Intended learning outcomes
To teach students the more advanced theory of ordinary differential equations and of dynamical systems and to give an introduction to modern computer based facilities (Maple). After a completed course, the student will be able to:

- Use some of the classical methods for solving special ordinary differential equations.
- Analyze the stability of equilibrium points for non linear autonomic systems via both linearisation and Liapunov functions.
- Formulate and analyze differential equations using simple models from physics, chemistry and biology.

Course content
Exact equations, integrating factor. Solving differential equations in Maple. Picards existence theorem. Linear differential equations with variable coefficients. Systems of linear differential equations, fundamental systems of solutions. Resolvent matrix and exponential matrix. Linearization. Stability theory for planar autonomous systems. Liapunov's theorem.

Teaching and working methods
Lectures, problem classes and computer exercises.

Examination

UPG1	Assignments	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

Grades
Four-grade scale, LiU, U, 3, 4, 5

Department
Matematiska institutionen

Director of Studies or equivalent
Jesper Thorén

Examiner
Stefan Rauch

Course website and other links
http://www.mai.liu.se/und/kurser/index-amne-tm.html

Education components
Preliminary scheduled hours: 64 h
Recommended self-study hours: 96 h

Course literature

Additional literature

Books

Edwards & Penney, *Differential equations. Computing and Modelling* (3 ed.eller senare.)

Other

Kurt Hansson, Föreläsningar om ordinära differentialekvationer (pdf-dokument)

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.