

## Applied Calculus

### Applied Calculus/Tillämpad analys

7.5 credits

7.5 högskolepoäng

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**Ladok Code:** 41T02A

**Version:** 1.0

**Established by:** Board of the department 2010-04-09

**Valid from:** Spring 2010

**Education Cycle:** First cycle

**Main Field of Study (Progressive Specialisation):** Mathematics/Applied Mathematics (G1N)

**Disciplinary Domain:** Natural sciences

**Prerequisites:** The courses Linear Algebra and Calculus.

**Subject Area:** Mathematics

**Grading Scale:** ECTS-credits

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## Content

This course uses techniques and theory from Linear Algebra and Calculus to develop methods used for mathematical modelling in economics and logistics. The methods presented are differential equations, dynamical systems, recurrence equations and optimization of functions in several variables. Computer based tools are used to facilitate realistic computations.

### Differential equations

- First order differential equations
- Methods of solution
- Dynamic systems in one and several variables
- Numerical solutions of differential equations
- Applications in economical modelling

### Recurrence equations

- Solution methods
- Applications

### Analysis in several variables

- Partial derivatives and gradients
- Taylor expansion of functions in two and three variables
- Quadratic forms in two and three variables

### Optimization of functions of several variables

- Conditions for local maximum at an inner point
  - Maxima at boundary points
- Lagrange multiplier method, gradients and boundary normals  
– Karush-Kuhn-Tucker conditions

## Learning Outcomes

Learning outcomes

After passing the course the student should be able to:

1. Recognize systems in logistics and economics where mathematical modeling can be used
2. Define relevant variables and parameters for such models

3. Set up relevant equations (in terms of these variables and parameters) for such systems
4. Analyze and solve such equations and systems of equations using the methods listed under Contents.

### **Forms of Teaching**

Lectures, exercise classes, computer laboratory work.

The language of instruction is English.

### **Forms of Examination**

The course will be examined through the following examination elements:

#### *Examination*

Learning outcomes:

Credits: 7.5

Grading scale: ECTS-credits

Student rights and obligations at examination are in accordance with guidelines and rules for the University of Borås.

### **Literature and Other Teaching Materials**

#### **Literature**

1. Alpha C. Chiang and Kevin Wainwright  
Fundamental Methods of Mathematical Economics  
McGraw-Hill, 4:th international edition, 2005

2. Matlab computer software

### **Student Influence and Evaluation**

The head of department and the course coordinator are responsible for a continuous and systematic collection of students' views. The evaluation report is presented for the students and will be the basis for the future design of the course.

### **Miscellaneous**