JÖNKÖPING UNIVERSITY
School of Engineering

COURSE SYLLABUS

Multivariable Calculus, 7.5 credits

Flervariabelanalys, 7,5 högskolepoäng

Course Code:	TFVK17	Education Cycle:	First-cycle level
Confirmed:	Mar 05, 2025	Disciplinary domain:	Natural sciences
Revised:	Sep 29, 2026	Subject group:	Mathematics
Valid From:	Jan 18, 2027	Specialised in:	G1F First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and Understanding

- demonstrate an understanding of the basic concepts and theorems in the differential and integral calculus in several variables

Skills and Abilities

- demonstrate the ability to sketch regions given by inequalities and to parametrize some standard curves and surfaces
- demonstrate the ability to compute partial derivatives, linearize a function or a parametrization, find directional derivatives and identify the directions of fastest increase and decrease of a differentiable function
- demonstrate the ability to identify and classify local critical points of a function; find local and global extremes with or without constraints
- demonstrate the ability to set up and solve double and triple integrals
- demonstrate the ability to identify conservative vector fields and determine their potentials
- demonstrate the ability to compute line and surface integrals over scalar and vector fields either via parametrization, or, when possible, using Green's, Gauss' or Stokes formulas.

Content

The course presents the basics of the Calculus in several variables.

The course focuses on the following topics:

- Curves and surfaces in implicit form and parameter form (in particular the quadrics)
- Basic set-theoretical concepts. Polar, cylindrical and spherical coordinates
- Functions of several variables, level curves and surfaces
- Limits and continuity, partial derivatives
- Gradient, differentiability, directional derivatives and linerization
- The chain rule, change of variables, the nabla differential operator, curl and divergence. Higher order partial derivatives, the Laplace and wave PDEs
- Second-order Taylor polynomial, classification of critical points and identification of local extremes
- Optimization on compact domains, optimization subject to constraints, Lagrange multipliers
- Double and triple integrals, Fubini evaluation, change of variables
- Basic calculus of vector-valued functions, line and surface integrals, conservative fields, potentials
- The Green's, Gauss' divergence and Stokes formulas.

Type of Instruction

Lectures and seminars.

Language of instruction is Swedish or English.

Entry Requirements

General entry requirements and completed course Single Variable Calculus, 6 credits and Linear Algebra, 6 credits or Basic Calculus, 6 credits and Linear Algebra and Optimization, 7.5 credits (or the equivalent)

Examination and Grades

The course is graded 5, 4, 3 or U.

Registration of examination:

Name of the Test	Value	Grading
Examination	7.5 credits	5/4/3/U

Course Literature

Please note that the course literature may be revised up to eight weeks before the start of the course.

Title: Multivariable calculus
Author: Briggs/Cochran
ISBN: 9780321664150