



Faculty of Health, Science and Technology
Mathematics

Syllabus

Calculus and Geometry

Course Code:	MAGA52
Course Title:	Calculus and Geometry <i>Analys och geometri</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
MAA (Mathematics)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2024-03-07, and is valid from the Autumn semester 2024 at Karlstad University.

Prerequisites

Registered for Foundation Course in Mathematics, 7.5 ECTS credits, or equivalent

Learning Outcomes

The aim of the course is for students to acquire knowledge, skills, and insights into calculus in one variable and vector geometry.

Upon completion of the course, students should be able to:

- formulate, explain and apply the definition of the integral, integration rules, and the fundamental theorem of calculus,
- use the most common techniques of integration,
- use integrals in applications such as calculating areas of plane domains, arc lengths, and volumes of solids of revolution,

- handle generalised integrals as limits of definite integrals,
- solve first order linear or separable ordinary differential equations,
- solve linear ordinary differential equations with constant coefficients,
- determine whether a series is convergent or divergent, and identify and calculate the sum of geometric series,
- give an account of and apply basic concepts in vector algebra in two and three dimensions in problem-solving,
- parametrise curves,
- perform checks of results and assess their feasibility and accuracy,
- show understanding of the subject by combining different concepts, theorems, and examples from problem-solving exercises and discover analogies and make generalisations.

Content

Instruction is in the form of lectures and exercises.

Main course components:

- Integrals: primitive functions, fundamental theorem of calculus, integration by substitution, partial integration, integration of rational functions, generalised integrals.
- Applications of integrals: areas of plane domains, arc lengths, volumes of solids of revolution.
- Ordinary differential equations: first order linear and separable differential equations, linear differential equations with constant coefficients, and integral equations.
- Series: the concepts convergence and divergence, geometric series, comparison test, ratio test, integral test.
- Vectors in the plane and space, scalar and vector product, lines and planes, distance between points, lines and planes.
- Equations for surfaces and equations and parametric representations of curves.

Reading List

See separate document.

Examination

Assessment is based on an individual written exam.

The number of assessment opportunities is limited to three per academic year.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For students in Engineering, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), U (Fail) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.