MATC25, Mathematics: Calculus of Variations, 7.5 credits
Matematik: Variationskalkyl, 7,5 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2016-02-25 and was last revised on 2016-02-25. The revised syllabus applies from 2016-02-25, spring semester 2016.

General Information

The course is an elective component at first-cycle level for a Bachelor of Science or a Master of Science degree in Mathematics.

Language of instruction: English and Swedish

Main field of studies	Depth of study relative to the degree requirements
Mathematics	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

On completion of the course, the students shall have acquired the following knowledge and competence:

Knowledge and understanding
On completion of the course, the students shall be able to:

- present and discuss mathematical reasoning, orally and in writing,
- account for fundamental concepts and methods in calculus of variations.

Competence and skills
On completion of the course, the students shall be able to:

- identify problems that can be modelled using the introduced concepts,
- integrate methods and approaches from different parts of the course to solve problems and answer questions within the scope of the course,
- account for the solution to a mathematical problem within the scope of the course, orally and in writing, in a logically coherent way using appropriate terminology.

Course content

- Variational problems with and without constraints. Euler's equations with and without constraints. Legendre's, Jacobi's and Weierstrass's necessary conditions for local minima.
- Hilbert's invariant integral and Weierstrass's sufficient conditions for strong local minima.
- Hamilton's principle and Hamilton's equations. Lagrange and Mayer problems.

Course design

The course is made up of lectures. Compulsory written assignments are a component of the course.

Assessment

The assessment is based on written assignments and an oral exam. Students who fail an assessment will be offered another opportunity for assessment soon thereafter.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
The final grade is determined by the aggregated results of the different assessed components.

Entry requirements

To be admitted to the course, students are required to have at least 60 credits in mathematics which are to include MATB22 Linear Algebra 2, 7.5 credits, and MATB21 Multivariable Calculus 1, 7.5 credits and MATB23 Multivariable Calculus 2, 7.5 credits, or equivalent.

Subcourses in MATC25, Mathematics: Calculus of Variations

Applies from V16

1601 Assignments / Oral Exam, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction