



LUND
UNIVERSITY

Faculty of Science

MATP36, Mathematics: Partial Differential Equations, 7.5 credits

Matematik: Partiella differentialekvationer, 7,5 högskolepoäng
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2021-05-28 to be valid from 2021-05-28, spring semester 2022.

General Information

The course is an alternatively compulsory course for second-cycle studies for a Degree of Master of Science (120 credits) in mathematics.

Language of instruction: English

Main field of studies

Mathematics

Depth of study relative to the degree requirements

A1F, Second cycle, has second-cycle course/s as entry requirements

Learning outcomes

The overall purpose of the course is that the students after completing the course should have acquired basic knowledge in partial differential equations, which is an important tool in science and technology. The purpose is also that the students should have further developed their ability to solve problems and communicate mathematical reasoning.

Knowledge and understanding

After completing the course the student should be able to:

- explain in depth the concepts, theorems and methods included in the course,
- identify and prove the most important theorems in the course.

Competence and skills

After completing the course the student should be able to:

- apply and integrate knowledge from the different parts of the course in connection with problem solving,
- identify problems that can be solved by methods that are part of the course and use an appropriate solution method,
- describe the solution to a mathematical problem within the course framework in speech and writing, logically coherent and with adequate terminology.

Judgement and approach

After completing the course, the student should be able to:

- argue for the importance of partial differential equations as a tool for other areas, both within other parts of mathematics and other subjects, e.g. physics.

Course content

The course treats:

- The method of characteristics and nonlinear equations of the first order.
- Laplace's equation. The heat equation. The wave equation.
- The Cauchy-Kowalevski theorem.
- Sobolev spaces.
- Existence, uniqueness and regularity for weak solutions to linear second order elliptic, parabolic and hyperbolic equations.
- Maximum principles for elliptic and parabolic equations.

Course design

The teaching consists of lectures and seminars.

Assessment

The examination consists of a written examination and an oral examination at the end of the course. The oral examination may only be taken by those students who pass on the written examination. Students who fail the regular written respectively oral examination are offered a re-examination shortly thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

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 marking scale for both the written and the oral examination is Pass, Fail. To pass the course it is required to pass the written examination and the oral. In addition, the grade Pass with distinction requires that the total number of points obtained in the written and the oral examination is at least 75% of the maximum total number of points. The maximum number of points that can be obtained in the written and the oral examination are weighted five to two.

Entry requirements

For admission to the course, English 6/B is required as well as at least 90 higher education credits in mathematics, including knowledge equivalent to the courses MATB24 Linear Analysis, 7.5 credits, MATC12 Ordinary Differential Equations 1, 7.5 credits and MATM12 Analytic Functions, 15 credits.

The courses MATM39 Integration Theory, 7.5 credits and MATP35 Linear Functional Analysis, 7.5 credits are recommended but not compulsory.

Further information

The course may not be included in a degree together with MATP16 Partial Differential Equations, 7.5 credits.

Subcourses in MATP36, Mathematics: Partial Differential Equations

Applies from V22

- 2201 Written examination, 5,0 hp
Grading scale: Fail, Pass
- 2202 Oral Examination, 2,5 hp
Grading scale: Fail, Pass