Faculty of Science

MATB24, Mathematics: Linear Analysis, 7.5 credits

Matematik: Lineär analys, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-07-07 to be valid from 2017-07-07, autumn semester 2017.

General Information

The course is an elective course for first-cycle studies for a Bachelor of Science in Mathematics.

Language of instruction: English
The course will be given in English on request.

Main field of studies	*Depth of study relative to the degree requirements*
Mathematics	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that students on completion of the course should have acquired the following knowledge and skills:

Knowledge and understanding

On completion of the course, the student shall be able to:

- explain mathematical concepts and methods that relate to the theory of numerical series and function series, Fourier series and Fourier transform,
- solve initial and boundary value problems for classic partial differential equations.

Competence and skills

On completion of the course, the student shall be able to:

- interpret relevant information and independently identify, formulate and solve problems that concern the fields that have been listed under the course contents,

- handle problems related to basic Linear analysis,
- identify the logical structure in mathematical arguments and carry out mathematical proofs,
- communicate mathematical arguments in speech and writing,
- determine which convergence concept is suitable to use in different contexts.

Judgement and approach

On completion of the course, the student shall be able to:

- evaluate and use formal treatment of mathematics.

Course content

- Numerical series, convergence criteria
- Function series, power and Fourier series, absolute and uniform convergence, pointwise convergence
- Important theorems about Fourier series: Parseval's formula, Bessel´s inequality, convergence theorems
- Cosine and sine series
- Applications within classical partial differential equations
- The Fourier transform, theory and applications

Course design

The teaching consists of lectures and exercise sessions. An essential feature of the exercise sessions is training in problem solving and mathematical communication. Compulsory assignments are part of the course.

Assessment

The examination consists of presentation of assignments, a written examination and possibly a corresponding oral examination. The oral examination is mandatory only to obtain the grade Passed with distinction and is given only to those students who have passed the corresponding written examination.
For students who have not passed the ordinary written examination, a re-examination is offered 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.
To achieve the grade Pass, it is required to pass the assignments and the written examination. To achieve the grade Pass with distinction, it is also required to pass the corresponding oral examination. Whether the grade Pass with distinction should be

given is decided by combining the results of the included examination parts.

Entry requirements

For admission to the course, general entry requirements and knowledge equivalent to the courses MATA21 Analysis in one variable, 15 hp, MATA22 Linear Algebra 1, 7,5 hp, MATB21 Analysis in several variables 1, 7,5 hp, MATB22 Linear Algebra 2, 7,5 hp and one of the courses MATA23 Foundations of algebra, 7,5 hp or NUMA01 Computational programming with Python, 7,5 hp. are required.

Further information

The course may not be included in a higher education qualification together with neither MATB12 Fourier analysis, 7,5 credits nor with MATB16 Linear analysis 7,5 credits.

Subcourses in MATB24, Mathematics: Linear Analysis

Applies from H17

1701 Written Examination, 7,5 hp
Grading scale: Fail, Pass
1702 Assignments, 0,0 hp
Grading scale: Fail, Pass
1703 Oral Examination, 0,0 hp
Grading scale: Fail, Pass, Pass with distinction