

SYLLABUS

Mathematical Physics 7.5 credits M0014M

Matematisk Fysik

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2022-11-07**

Mathematical Physics 7.5 credits M0014M

Matematisk Fysik

First cycle, M0014M

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Matematik	Mathematics

Main field of study

Engineering Physics and Electrical Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and M0047M Differential calculus, M0048M Linear Algebra and Calculus, M0049M Linear Algebra and Differential Equations, M0055M Multivariable calculus or corresponding.

Linear Analysis M0018M, or corresponding.

Selection

The selection is based on 1-165 credits.

Course Aim

After finishing the course the student should

- be able to formulate partial differential equations, boundary- and initial conditions, starting with problems from physics and also be able to solve partial differential equations with different methods, for example by expansion in different orthogonal systems or by transform methods and also be able to give a physical interpretation of the solution.
- acquire basic knowledge about the theory of Hilbert spaces including symmetric operators, specially Sturm-Liouville operators.
- acquire basic knowledge of some special functions as orthogonal polynomials and Bessel functions.
- acquire basic knowledge of the theory of distributions and be able to use distributions as the Delta function to describe various physical situations.

Contents

Physical models: Derivation of the heat equation, Laplace's equation and the wave equation. Boundary- and initial conditions, uniqueness- and stability conditions, classification, superposition. d'Alembert's formula for the wave equation. Fourier's method: Separation of variables. Eigenfunction expansion methods, the use of Fourier- and Laplace transforms. Function spaces: Orthogonal projections, convergence in norm, symmetric operators, Sturm-Liouville operators, generalized Fourier series, Bessel- and Legendre functions, distributions, Laplace- and Fourier transforms.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Lectures and lessons.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Written exam.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Remarks

The course is given in Swedish.

Overlap

The course M0014M is equal to MAM236

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Written exam and/or compulsory assignments	G U 3 4 5	7.5	Mandatory	A07	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Niklas Lehto, Head of Undergraduate Education 2022-11-07

Syllabus established

The course plan was established by the Dept of Mathematics to be in force from H07 (August 2007).