Mathematics

Programme course

6 credits

Matematik

NMAA17

Valid from: 2017 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined
2017-01-25

Main field of study
Mathematics

Course level
First cycle

Advancement level
G1X

Course offered for
- Biology, Bachelor´s Programme

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Intended learning outcomes
That you as a student will learn to feel confident with the mathematical expressions, reasoning and relations which are basic to scientific and technical subjects. After a completed course you should be able to:

- Read and interpret mathematical texts
- Explain definitions and expressions like local extremes, limits, continuity, derivatives, primitive functions and integrals
- Explain and use central theorems like The Fundamental Theorem of Calculus, Mean-Value Theorems, The Intermediate-Value Theorem and The Max-Min Theorem.
- Use mathematical laws for limits of functions, derivatives, antiderivatives and integrals.
- Perform investigations of functions using derivatives, limits and the properties of basic functions and from this draw conclusions regarding the properties of the functions
- Use standard techniques to calculate antiderivatives and definite integrals.
- Handle differential equations (first-order separable and first-order linear equations.)
- Use Maclaurin expansions to approximate functions and investigate limits.
- Solve linear systems of equations using elimination
- Carry out matrix computations
- Compute 2x2 and 3x3 determinants
- Define and compute eigenvalues and eigenvectors of matrices
- Perform checks of results and calculations to verify that they are correct and reasonable.

Course content

Equations and systems of equations. Geometric and arithmetic series. Inequalities. Exponential functions and logarithms. Trigonometric functions. Derivative and the study of functions.Functions of a real variable. Polynomials. Elementary functions. Sequences, limits. Derivatives and continuity. Rules for differentiation. Properties of continuous functions. Study of functions. Antiderivatives. Integration and geometrical applications, including area. Improper integrals. Taylor's formula. Maclaurin expansions of elementary functions with applications to the calculation of limits. Linear ordinary differential equations of first order, separable equations. Systems of linear equations and matrices. Determinants. Eigenvalues and eigenvectors. Models of Population Biology and Leslie matrices

Teaching and working methods

Teaching is done in lectures and problem classes. Theory is followed up by problem-solving by the lecturer. The examination consists of a written test.

Examination

TEN1	Written examination	6 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Matematiska institutionen

Director of Studies or equivalent

Jesper Thorén

Examiner

Magnus Berggren

Course website and other links

http://www.mai.liu.se/und/kurser/index-amne-tm.html

Education components

Preliminary scheduled hours: 50 h
Recommended self-study hours: 110 h

Course literature

Rodhe/Sigstam: Naturlig matematik. Upplaga 4.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.