Linnæus University

Course syllabus

Faculty of Technology
Department of Mathematics

4MA451 Forskningsmetodik, 7,5 högskolepoäng
Research Methodology, 7.5 credits

Main field of study
Mathematics

Subject
Mathematics

Level
Second cycle

Progression
A1F

Date of Ratification
Approved 2014-10-03.
Revised 2024-03-11. Revision of content, prerequisites and clarifications regarding examination.

The course syllabus is valid from autumn semester 2024.

Prerequisites
60 credits in mathematics at the advanced level including 4MA441 Mathematical Modelling II or equivalent and at least one of the courses 4MA423 Mathematical Cryptography, 4MA424 Coding Theory or one of the courses 4MA412 Distribution Theory, 4MA430 Calculus Advanced Course II or one of the courses 4MA503 Stochastic Analysis, 4MA505 Financial Modelling with Stochastic Processes, 4MA502 Insurance Mathematics, 4MA507 Risk and Portfolio Analysis.

Objectives

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

- identify and discuss basic scientific methods.
- identify and discuss ethical and societal aspects regarding research in mathematics.
- identify, discuss and analyze, in writing as well as orally, research reports within the student's own field of specialization with regard to current research situation, purpose, problem formulation and method.
- discuss and analyze, in writing as well as orally, the written presentation in research reports in mathematics based on accepted practice in mathematical report writing.
- easily accessible and comprehensible, in writing as well as orally, present research reports and scientific articles to different groups.
- construct a realistic project plan containing a summary of the research area, purpose, timetable, problem formulation, and methodological approach for a scientific study within the student's own field of specialization and present this orally.

Content

Basic concepts in scientific theory. Ethical and societal aspects of research and degree projects in mathematics. Formulation of mathematical research problems and methodological approaches. Mathematical writing and writing scientific reports in mathematics. Analysis and evaluation of published articles in mathematics and/or applied mathematics. Literature search. Popular science presentations, both oral and written, of research results. Designing, and written as well as oral presentation, of a project plan (containing summary of research area, purpose, problem formulation and methodological approach) for a potential degree project in mathematics. Contact with current research in the form of participation in adapted research seminars at the department.

Type of Instruction

The teaching consists of lectures, exercises, project work and seminars. Seminars are mandatory.

Examination

The course is assessed with the grades A, B, C, D, E or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The examination consists of oral and written presentation of assignments and project plan as well as active participation in mandatory seminars.

Resit examination is offered in accordance with Linnaeus University's Local regulations for courses and examination at the first- and second-cycle levels.
In the event that a student with a disability is entitled to special study support, the examiner will decide on adapted or alternative examination arrangements.

Course Evaluation

A course evaluation should be conducted during the course or in connection with its conclusion. The results and analysis of the completed course evaluation should be promptly communicated to students who have completed the course. Students

participating in the next course instance should be informed of the results of the previous course evaluation and any improvements that have been made, no later than at the start of the course.

Overlap

The course cannot be included in a degree along with the following course/courses of which the content fully, or partly, corresponds to the content of this course:
4MA151 Research Methodology, 7.5 credits

Other Information

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Required reading
Alex Rosenberg, *Philosophy of Science - A contemporary introduction*, Routledge, latest edition. Approx. 150 out of 300 pages.

American Mathematical Society, *Ethical guidelines*, accessed on 2022-09-28. Link: http://www.ams.org/about-us/governance/policy-statements/sec-ethics

Nicholas J Higham, *Handbook of Writing for the Mathematical Sciences*, latest edition. Approx. 170 out of 350 pages.

Franco Vivaldi, *Mathematical Writing*, Springer, latest edition. Approx. 100 out of 200 pages.