



FSF3672 Non - Linear Wave Equations 15.0 credits

Icke - linjära vågekvationer

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSF3672 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Prerequisite for the course is a strong knowledge of differential geometry (differential manifolds, tensors, differential forms) corresponding for example to the advanced level course SF2722 "Differential geometry" and the course SF3670, Semi-Riemannian geometry I.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the student should have a sufficiently deep knowledge of non-linear wave equations to be able to start working on research projects in the area.

Course contents

Local existence and uniqueness of solutions to non-linear wave equations, continuation criteria, Sobolev embedding, characterisations of global hyperbolicity, the constraint equations for Einstein's equations, local existence and uniqueness of solutions to Einstein's equations, existence of a unique maximal Cauchy development of given initial data to Einstein's equations.

Disposition

The course can be given a series of lectures (possibly with presentations given by the participants), or as a self-studies course with supervision.

Course literature

The course is primarily based on the book “The Cauchy Problem in General Relativity”, European Mathematical Society, 2009, by Hans Ringström. Also used in the course is the book: “Semi-Riemannian Geometry With Applications to Relativity”, Academic Press, Orlando 1983, by Barrett O'Neill.

Examination

- HEM1 - Home assignments, 15.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Homework assignments and oral test or presentation.

Other requirements for final grade

Homework assignments completed, and satisfactory performance at oral test or presentation

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.