FSF3629 Constructions in Dynamical Systems 7.5 credits

Konstruktioner inom dynamiska system

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 FSF3629 valid from Autumn 2016

Grading scale

Education cycle

Third cycle

Specific prerequisites

A Master degree including at least 30 university credits (hp) in in Mathematics.

Knowledge of basic notions in dynamical systems and real analysis.

Language of instruction

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

Intended learning outcomes

The students will learn several important techniques used in the theory of dynamical systems, including the KAM-methods, the method of approximations by conjugation, topological construction methods. The chosen techniques are central tools in the modern research of dynamical systems. In the course we give examples of application of these techniques to a variety of problems. This will give the students a broad overview of several active fields of research. The students will also practice and improve their presentation skills.

Course contents

Analysis of low-dimensional dynamical systems; mainly maps of the circle, the annulus and the torus. Twist maps (existence of periodic points, versions of the invariant curve theorem, Aubry-Mather sets). Maps of the annulus or the torus with exotic behavior (examples by Furstenberg, Kan). Poincaré-Siegel theorem. Renormalization methods for period-doubling bifurcations and the Feigenbaum constant. Random products of matrices.

Disposition

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

Course literature

Several topics in the course are contained in the book “Introduction to the modern theory of dynamical systems” by A.Katok and B. Hasselblatt. Research articles can also be used.

Examination

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.

Presentations of the course material and active participation at the lectures/seminars, or homework assignments and oral exam.

Other requirements for final grade

Satisfactory performance at presentations, or homework assignments completed and satisfactory oral test.

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.