

10424-758(8) Dynamical Systems and Complexity (1½l, 1½p)

2012

Course summary:

Introduction to non-linear dynamical systems: modeling, continuous and discrete mappings, stability analysis, hierarchy of chaos, strange attractors, universality and Feigenbaum constants, Hamiltonian chaos, KAM theorem.

Outcomes of course:

The student is skilled in a number of concepts to analyze continuous as well as discrete (in time) dynamical systems, quantify statistical properties of the dynamics, and classify the “chaoticity” of these systems. The student will be introduced to renormalization techniques, learn about fractality, and apply these concepts to a number of model systems related to interdisciplinary applications.

Lecturer:

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Course content:

Formal lectures

Introduction to non-linear dynamical systems: modeling, continuous and discrete mappings, stability analysis, hierarchy of chaos, strange attractors, universality and Feigenbaum constants, Hamiltonian chaos, KAM theorem.

Practical (Tutorials):

Tutorials (3h/week) enable the student to cope with exercises and standard problems.

Study material:

Heinz-Georg Schuster, *Deterministic Chaos: An Introduction*, Wiley VCH 2005, 4th edition.
E. A. Jackson, *Perspectives of Nonlinear Dynamics 1 + 2*, Cambridge University Press 1989.

Learning opportunities:

More information will follow.

Assessment:

Methods of Assessments

Continuous Assessment

Venue and time of assessment opportunities

In consultation with the lecturer.

Availability of marks:

As soon as possible.

Calculation mark:

Test: 50%

Homework assignments: 50%