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

2015

Course summary:

(Presentation subject to staff availability and student numbers)
Introduction to non-linear dynamical systems: modelling, continuous and discrete mappings, stability analysis, hierarchy of chaos, strange attractors, universality an 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:

Prof M Kastner
Telephone number: 021 808 3863
E-mail address: kastner@sun.ac.za
Office: NITheP, Wallenberg Centre, STIAS

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%