

SLUkurs

Syllabus

PAS0013 Nonlinear Dynamics and Chaos, 7.5 credits

Syllabus approved

2002-12-12

Subjects

Statistics, Computer Science and Systems Science/Mathematics

Education cycle

Third cycle

Grading scale

Pass / Failed

The requirements for attaining different grades are described in the course assessment criteria which are contained in a supplement to the course syllabus. Current information on assessment criteria shall be made available at the start of the course.

Language

English

Prior knowledge

Differential equations; Taylor series; Linear algebra.

Objective, including learning outcomes

The course is suggested to give a basic knowledge about fundamental concepts of nonlinear dynamics with applications to physics, biology, engineering etc.

Content

Flow on the line, fixed points and stability. Bifurcations, bifurcation points, saddle-node bifurcation, transcritical bifurcation, pitchfork bifurcation. Flows on the circle. Linear systems, classification of linear systems. Phase plane, phase portraits, conservative and reversible systems. Limit cycles. Bifurcation revisited, Poincaré maps. Lorenz equations, chaos on a strange attractor, Lorenz map. One-dimensional maps, logistic maps, Lyapunov exponent. Fractals, fractal dimensions. Strange attractors.

Requirements for examination

Exercises and an oral or written examination at the end of the course (5p).

Additional information

Responsible department

Department of Energy and Technology