

Optimization and Dynamics

Course Syllabus Summer Term 2008 — Bielefeld

Course Title	Optimization and Dynamics
Instructors	Gerald Trutnau (lecture), Gennady Noskov (tutorial)
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Course Objective	The course gives an introduction to dynamical systems (discrete and continuous). Students shall learn the basic quantitative and qualitative methods to solve dynamical systems and shall become acquainted with the typical phenomena arising in linear and non-linear systems.
Prerequisites	first courses in linear algebra and analysis
References	R. L. Devaney, <i>An Introduction to Chaotic Dynamical Systems</i> , Addison-Wesley, 1989 D. K. Arrowsmith, <i>An introduction to dynamical systems</i> , Cambridge Univ. Press, 1994 additional ones may be given in the lecture
Description	discrete and continuous dynamical systems, linear and non-linear, stability, bifurcations, chaos
Tentative content	dynamical systems with discrete time: one-dimensional systems and n -dimensional systems; linear and non-linear systems; stability; bifurcations; period doubling; chaos; dynamical systems with continuous time: linear differential equations; non-linear autonomous differential equations; existence and uniqueness of solutions; stability; flow; Poincaré maps; bifurcation; homoclinic points; chaos
Teaching Method	Lecture, exercises (tutorial)
Attendance	recommended; every week exercises have to be calculated; at least two times during the semester an exercise has to be presented by a student at the blackboard.
Evaluation	there is a Midterm (10.06.08) and Final exam (15.07.08); Students must solve exercises every week and must obtain at least 50% of the points in total.