

Optimization and Dynamics

Course Syllabus

Summer Term 2007 — Bielefeld

Course Title	Optimization and Dynamics
Instructors	Peter Zeiner
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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	will be adapted according to the knowledge and needs of the students, some items may be added or skipped. 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 at the blackboard.
Evaluation	Final exam at the end of the semester; Students must solve exercises every week and must obtain at least 50% of the points in total.