

# Optimization and Dynamics

Summer Semester 2015

<b>Course Title</b>	Optimization and Dynamics
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<b>Course Objective</b>	The course gives an introduction to dynamical systems, both discrete and continuous. Students will learn the basic quantitative and qualitative methods to solve problems arising in the study of dynamical systems and will become acquainted with typical phenomena associated with linear and non linear systems.
<b>Prerequisites</b>	First courses in linear algebra and analysis
<b>References</b>	R. L. Devaney, <i>An introduction to chaotic dynamical systems</i> , Addison-Wesley, 1989 D. K. Arrowsmith and C. M. Place, <i>An introduction to dynamical systems</i> , Cambridge Univ. Press, 1990 (Additional references may be given during the lectures.)
<b>Description</b>	Discrete and continuous dynamical systems; linear and non-linear stability; bifurcations; chaos.
<b>Tentative content</b>	<ul style="list-style-type: none"><li>• dynamical systems with discrete time:<ul style="list-style-type: none"><li>• one-dimensional systems and <math>d</math>-dimensional systems</li><li>• linear and non-linear systems</li><li>• stability</li><li>• bifurcations</li><li>• period doubling</li></ul></li><li>• dynamical systems with continuous time:<ul style="list-style-type: none"><li>• linear differential equations</li><li>• non-linear autonomous differential equations</li><li>• existence, uniqueness and stability of solutions</li><li>• flow</li></ul></li><li>• symbolic dynamics</li></ul> <p><i>Note: Content will be adapted according to the knowledge and needs of the students, some items may be added or skipped.</i></p>
<b>Teaching Method</b>	Lectures, tutorials, exercises
<b>Evaluation</b>	One final exam