

# Intense course on numerical bifurcation analysis, spring 2011

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This intensive course presents modern numerical methods and software for bifurcation analysis of parameter-dependent systems of smooth autonomous ordinary differential equations (ODEs). The main problems are: How to continue equilibria and periodic orbits with respect to a parameter? How to compute stability boundaries of equilibria and periodic orbits (limit cycles) in the parameter space? How to predict qualitative changes in system's behavior (bifurcations) occurring at these boundaries? How to locate and continue homoclinic orbits to equilibria? Only the most efficient methods will be described, which are based on projection and bordering techniques and employ boundary value problems (BVPs). These methods have been recently implemented in MATCONT, an interactive MATLAB bifurcation software for ODEs. An integral part of the course are computer sessions at which the students will learn how to use the latest version of MATCONT. No preliminary knowledge of bifurcation theory is assumed.

### Lecturer

Prof. Yuri Kuznetsov (University of Utrecht)

### Scope

4 cu.

### Type

Advanced studies.

### Prerequisites

Differential equations

### Lectures

14-18 March:

Lectures: B120 Mon-Thu 10-12 and D123 Fri 10-12

Labs: C128 Mon-Wed and Fri 13-14, Thu 15-16

### Bibliography

Yuri Kuznetsov: Elements of Applied Bifurcation Theory (Springer)

Download the online course material from [here](#)

### Registration

Registration should be made by sending an email to [Eva Kisdi](#)

Note that there's a limit of 24 participants to the course.

This course is jointly supported by the Centre of Excellence in Analysis and Dynamics Research, the Finnish Doctoral Programme in Computational Sciences, and the University of Helsinki.