

Course description for International Master's program „Mathematical Modeling, Computation and Optimization“

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| Course Name | Numerical Methods for Ordinary Differential Equations (ODEs) |
| Contents and Objectives | <p><u>Contents:</u></p> <ul style="list-style-type: none"> • initial value problems (one-step methods, in particular explicit and implicit Runge-Kutta methods; step size control; multi-step methods; consistency, stability, convergence, stiff systems) • boundary value problems (shooting, difference and collocation methods) <p><u>Objectives:</u> This lectures offers an overview of numerical solution methods for initial and boundary value problems for systems of ordinary differential equations. You will get to know the basic tools to analyze their properties, such as the order of convergence and suitability for stiff problems. Through the lab, you will acquire hands-on experience in solving ordinary differential equations.</p> |
| Teaching | <p>This course consists of lectures and exercise classes.</p> <ul style="list-style-type: none"> • Lecture: Numerical Methods for ODEs (3h/week) • Exercise: Numerical Methods for ODEs (1h/week) |
| Prerequisites | Basic notions of Analysis and Linear Algebra, some Complex Analysis is helpful. |
| Examination | Oral exam (30 minutes) |
| Credits | 6 ECTS points |
| Frequency | This course is given at least every other year. |
| Workload | The estimated total working time for this course is 270 hours. |
| Duration | This course is given during one semester. |