Course content for International Master program „Mathematical modeling, computation and optimization"

Course name	Functional Analysis
Contents and Objectives	Content: • Metric spaces • Banach spaces, Hilbert spaces, L^p-spaces • Continuous linear operators • Uniform Boundedness Principle • Closed Graph Theorem • Banach's Theorem and continuous invertibility • Open Mapping Theorem • Linear functionals, dual spaces and the Hahn-Banach Theorem • Spectral theory • Fredholm theory Objectives of the course: This class aims at introducing fundamental concepts of linear functional analysis such as the Uniform Boundedness Principle, the Closed Graph Theorem, or the Hahn-Banach Theorem. Several applications will be discussed.
Teaching	This course consists of lectures and exercise classes. • Lecture: Functional analysis (3h/week) • Exercise class: Functional analysis (1h/week)
Prerequisites	Basic notions of Analysis, Linear Algebra, and Measure Theory
Examination	Oral exam (30 minutes)
Credits	6 ECTS points
Frequency	This course is given every year.
Workload	The estimated total working time for this course is 180 hours.
Duration	This course is given during one semester.