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

Course name	Low-dimensional geometry and topology
Contents and Objectives	Content: • Selected topics from knot theory • 2-dimensional manifolds • 3-dimensional manifolds • Poincare and other abysses of the dimension • Differentiable manifolds • Riemann and Lorentz manifolds • Curvature tensor and Einstein's equations • Schwarzschild solution and black holes • Friedman solutions and the universe as a whole Objectives of the course: The lecture gives an introduction to several phenomena of low-dimensional geometry and topology, ranging from classification problems for manifolds through differential geometry in 3 and 4 dimensions up to the basics of the theory of general relativity.
Teaching	This course consists of lectures and exercise classes. • Lecture: Low-dimensional geometry and topology (2h/week) • Exercise class: Low-dimensional geometry and topology (2h/week)
Prerequisites	Basics of Analysis, Linear Algebra, and Group Theory
Examination	Oral exam (30 minutes)
Credits	6 ECTS points
Frequency	This course is given at least every second year.
Workload	The estimated total working time for this course is 180 hours.
Duration	This course is given during one semester.