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

Course name	Convex geometry and toric varieties
Contents and Objectives	Contents: • Convex bodies, cones and polytopes • Minkowski sum and mixed volume • Lattice polytopes and fans • Discrete and combinatorial convexity • Geometric inequalities • Affine and projective toric varieties • Sheaves and cohomology • Hirzebruch-Riemann-Roch theorem • Applications Objectives of the course: The lecture introduces students to some basic concepts of convex geometry and to its combinatorial algebraic counterpart – toric varieties. The emphasis will be on the beautiful interplay of these two theories. The far reaching applications will be the subject of more specialized lectures.
Teaching	This course consists of lectures and exercise classes. • Lecture: Convex geometry and toric varieties (4h/week) • Exercise class: Convex geometry and toric varieties (2h/week)
Prerequisites	Basic notions of Analysis, Linear Algebra and Algebra
Examination	Oral exam (30 minutes)
Credits	8 ECTS points
Frequency	This course is given at least every second year.
Workload	The estimated total working time for this course is 270 hours.
Duration	This course is given during one semester.