Module MA-INF 2205	**Geometry Processing I**		
Workload 180 h	**Credit points** 6 CP	**Duration** 1 semester	**Frequency** every year
Module coordinator	Prof. Dr. Reinhard Klein		
Lecturer(s)	Prof. Dr. Reinhard Klein		
Classification	**Programme** M. Sc. Computer Science	**Mode** Optional	**Semester** 2.
Technical skills	Analytical formulation of problems related to geometry processing and knowledge of techniques and algorithms to optimize, process and store geometry data. Especially, learning of techniques to generate highly detailed three-dimensional digital models of real objects and to implement current geometry processing algorithms.		
Soft skills	Analytical problem description, creativity, self-dependent solution of practical problems in the area of mesh processing, presentation of solution strategies and implementations, self-dependent literature research, collaboration abilities, self-management		
Contents	Topics among other will be: Methods for the generation of polygonal meshes (Laser scanning, registration and integration of single mesh parts, etc.), Point based representations, Reconstruction techniques, Efficient mesh data structures and mesh compression, Optimization: denoising and smoothing, Mesh decimation and refinement, Hierarchical representations: coarse-to-fine und fine-to-coarse, Editing of polygonal meshes. In addition results from state of the art research will be presented.		
Prerequisites	**Recommended:** Algorithms and data structures or knowledge of basic discrete differential geometry, knowledge on multidimensional analysis und linear algebra as well as numerical analysis and numerical linear algebra, C++		

Format	Teaching format	Group size	h/week	Workload[h]	CP
	Lecture	60	2	30 T / 45 S	2.5
	Exercises	30	2	30 T / 75 S	3.5
	T = face-to-face teaching; S = independent study				

Exam achievements	Oral exam (graded)
Study achievements	Successful exercise participation (not graded)
Forms of media	
Literature	• R. Scopigno, C. Andujar, M. Goesele, H. Lensch: 3D Data Acquistion, Eurographics Tutorial, 2002 • E. Grinspun, M. Desbrun (organizers): Discrete Differential Geometry: An Applied Introduction, Siggraph Course Notes, 2006 • M. Botsch, M. Pauly: Geometric Modeling Based on Triangle Meshes, Siggraph Course Notes, 2006