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| **Module name:** | **Computer Graphics and Interaction** |
| **Abbreviation:** | MIN-CGI |
| **Study Semester:** | 1st Semester (WiSe), Frequency: once a year |
| **Responsible for module:** | Volker Ahlers |
| **Teaching staff:** | Volker Ahlers, Frauke Sprengel, Ingo Ginkel |
| **Language:** | German or English |
| **Place in curriculum:** | Master, 1st Semester, module in specialization Computer Graphics |
| **Teaching methods/SWS:** | 2 SWS lecture, 2 SWS exercise |
| **Work required:** | Lecture = 34 h<br>Exercise = 34 h<br>Own study time = 112 h |
| **Credit points:** | 6 CP (= 180 h) |
| **Prerequisites acc. to exam regulations:** | None |
| **Recommended prerequisites:** | Introductory computer graphics lecture in Bachelor study program |
| **Learning goals:** | Algorithmic skills: Understanding of basic mathematical and algorithmic principles in computer graphics, in particular real-time rendering, and in virtual and augmented reality<br><br>Analysis, design and realization skills: Design and realization of interactive graphics applications with current graphics software; design and realization of natural user interfaces<br><br>Technological skills: Understanding of the function of current graphics processing units; knowledge of the use of computer graphics in various fields of application<br><br>Methodological skills: Knowledge of possibilities, benefits, and limits of using techniques of computer graphics as well as virtual and augmented reality |
| **Contents:** | • Basic principles: Real-time rendering, architecture of current graphics processing units, rendering pipeline, programmable shaders, concepts of virtual and augmented reality<br>• Advanced rendering techniques: mirrors, shadows, image-based rendering, particle systems, collision detection<br>• Modeling: Scene graphs, spatial data structures<br>• Interaction: Natural user interfaces, stereo rendering, motion tracking, application of appropriate peripheral devices<br>• Software: Current graphics, scene graph, and VR libraries, computer graphics applications |
| **Examinations:** | Examination (written or oral examination) and experimental work |
| **Media forms:** | Lecture: Presentation, board, examples, discussion<br>Exercise: Independent problem-solving in groups, project work with presentation of results, assessment and discussion of solutions, further discussion |
| **Literature:** | Lecture notes<br>Akenine-Möller, T., Haines, E., Hoffman, N.: Real-Time Rendering. A K Peters, latest edition<br>Nischwitz, A., Fischer, M., Haberäcker, P., Socher, G.: Computergrafik und Bildverarbeitung, Band 1. Vieweg+Teubner, latest edition |