

Only the german version of the module description as part of the study regulations is legally binding.

Module name	Foundations of Computer Graphics
Module number	INF-25-Ma-FVC-FCG
Responsible lecturer	Prof. Dr. Stefan Gumhold stefan.gumhold@tu-dresden.de
Qualification objectives	Students know the components of a graphical application and can design new graphical applications based on requirements. They can apply and analyze the basics of computer graphics in the solution of graphical problems. They have an overview of the sub-areas of modeling, rendering and animation and can establish links between the areas and work on cross-area problems. In addition, they can propose suitable geometric representations for a problem and reproduce, implement and analyze basic algorithms of geometric scene modeling. They know the stages of the rendering pipeline and can describe the underlying techniques. They can reproduce the idea of ray tracing and have a detailed idea of how to implement a ray tracer. They know basic animation techniques, can reproduce the mathematical background and describe how to enrich a graphical application with animations.
Content	Contents of the module are the handling of vectors and transformations, color perception and color spaces as well as the structure of graphics systems, modeling such as parametric curves and surfaces, basic modeling techniques and polygonal meshes as well as the representation with the rendering pipeline, the basic lighting calculation, texturing and the ray tracing method. Further content related to animation includes approaches based on keyframes, particle systems and morphing as well as the basics of using acceleration data structures.
Teaching and learning methods	The module comprises lectures of 2 SWS, exercises of 2 SWS and the self-study. The language of instruction for the lectures and exercises is English.
Prerequisites for participation	In the Diploma degree program in Computer Science, the Bachelor's degree program in Computer Science and the Bachelor's degree program in Applied Computer Science, the competencies to be acquired in the modules INF-25-Ba-Ma1 Linear Algebra and Analysis, INF-25-Ba-Prg Programming and RoboLab as well as INF-25-Ba-SWT Software Technology are required. In the Master's degree course in Computer Science, skills in vector spaces and matrices as well as imperative programming are required at Bachelor's level.
Applicability	The module is a compulsory elective module in the subject area Visual Computing and Machine Learning in the Diploma degree program in Computer Science in the main course of study, which must be selected in accordance with Annex 2 to the examination regulations. In the Bachelor's degree course in Computer Science, the module is a compulsory elective module in the subject specialization, which must be selected in accordance with the annex to the examination regulations. The module is

	a compulsory module in the specialization in Media Informatics in the Bachelor's degree course in Computer Science at . In the Master's degree course in Computer Science, the module is a compulsory elective module in the open track in the subject area of Visual Computing and Machine Learning as well as the supplement, which must be selected in accordance with Appendix 2 to the examination regulations. The module can only be chosen once in the Master's degree program in Computer Science. The module cannot be selected in the Master's degree program in Computer Science if this module or a module with substantially the same content from a degree program in which the admission requirements according to § 3 of the study regulations have already been met has already been completed. The module also creates the prerequisites for the modules listed under prerequisites for participation.
Requirements for earning credit points	The credit points are earned if the module examination is passed. The module examination consists of a written examination lasting 90 minutes. A bonus achievement for the written examination is the completion of 15 hours of exercises. The examination language is English.
Credit points and grades	6 credit points can be earned through the module. The module grade corresponds to the grade of the examination.
Module frequency	The module is offered every winter semester.
Workload	The total workload is 180 hours.
Module duration	The module comprises one semester.
Accompanying literature	Fundamentals of computer graphics, P. Shirley, M. Ashikhmin, S. Marschner. AK Peters/CRC Press, 2009.