



Course number:
14MSI40516AS
14MSI40517AS
Geometric Modelling
Study Level: Master / Graduate

Prof. Dr. Georg Umlauf
Language of instruction: English
ECTS Credits: 5

Objectives:

For artistic, industrial, and technical applications, such as the movie or the automotive industry, geometric objects need to be represented in the computer. For these representations it is irrelevant if the designed objects do exist physically (e.g. a car body) or if the designed objects are purely virtual (e.g. the characters in a computer animated film). Thus, these representations need to be designed to handle objects of arbitrary shape, dimension, and topology.

In this module up-to-date techniques and algorithms of CAD, CAGD, and computer graphics for the representation of free form geometry in artistic, industrial, and technical applications are presented. In the accompanying lab-assignments examples and case studies for these techniques will be implemented by the students.

Contents:

GM-Lecture

- Introduction to affine geometry
- Introduction to polynomial interpolation
- Geometric algorithms for the representation of curves and surfaces, e.g. splines, etc.
- Technical implementations for the modelling of free form curves, e.g. Bézier curves, b-spline curves, etc.
- Technical implementations for the modelling of free form surfaces, e.g. tensor-product surfaces, Bézier triangles, transfinite interpolation, etc.
- Current techniques and trends for the representation of surfaces of arbitrary topology, e.g. subdivision surfaces, etc.

GM-Lab

Programming assignments: Application examples and case studies, e.g. quaternion rotation and interpolation, modelling with Bézier-curves, intersection of Bézier curves, modelling with b-splines.

Assessment:

Assessment of this course will be based on a final oral examination and the solutions of the lab-assignments.