DEPARTMENT OF MATHEMATICAL SCIENCES

MMG640   Scientific Visualization, 7.5 higher education credits

Vetenskaplig visualisering, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Mathematical Sciences on 2017-06-14 to be valid from 2017-07-01, autumn semester of 2017.

Field of education: Science 100%
Department: Department of Mathematical Sciences

Position in the educational system

The course Scientific Visualization, 7.5 higher education credits, is one of several single subject courses included in the Bachelor Program in Mathematics. It is also open for eligible students outside the program. The course is considered advanced according to the requirements for the Degree of Bachelor in Mathematics.

The course can be part of the following programmes: 1) Mathematical Sciences, Master's Programme (N2MAT), 2) Bachelor's Programme in Mathematics (N1MAT) and 3) Complex Adaptive Systems, Master's Programme (N2CAS)

Main field of studies	*Specialization*
Mathematics	G2F, First Cycle, has at least 60 credits in first-cycle course/s as entry requirements

Entry requirements

The prerequisite for the course Scientific Visualization is the equivalent of 60 higher education credits, including the courses MMG300 Multivariable Analysis, MMG410 Numerical Analysis, and a basic course in programming.

Learning outcomes

After completing the course, the student will be able to

- use advanced MATLAB graphics
- represent rotations in computer graphics by quaternions
- use version control for collaborative programming
- visualize and animate simple particle systems
- use basic ParaView to visualize datasets
- construct simple interactive elements in visualizations
- apply basic shading of 3D objects

Course content

Various techniques for visualizing datasets: surfaces, volumes, and other mathematical objects. Transformations in computer graphics, including the use of quaternions for representing rotations. Version control system GIT, including online hosting, for collaborative programming. Visualization and animation of particle systems. Examples of how to include interactive elements in scientific visualizations. Basic shading, lighting, and rendering of 3D objects. The programming is done using MATLAB, Python, and HTML. Additional software in the course is ParaView and Blender.

Form of teaching

Language of instruction: Swedish
The language of instruction is English unless all involved are Swedish speakers.

Assessment

The examination consists of computer based assignments and a final take-home exam.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

Course evaluation

Oral and/or written course evaluation will be performed. The results of the evaluation will be communicated to the students and will serve as a guide for the development of the course.

Additional information

The syllabus for MMG640 was originally established to take effect from 2007-07-01, and was revised 2010-07-01.