

SYLLABUS

Computational Geometry 7.5 credits D7013E

Algoritmer för geometriska problem

Course syllabus admitted: Autumn 2012 Sp 1 - Present

DECISION DATE
2012-03-12

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Algoritmer för geometriska problem

Second cycle, D7013E

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Datalogi	Computer Technology

Entry requirements

To take this course you have to know how to program computers and analyze algorithms and data structures. The two courses D0010E and D0012E give a minimum suitable background.

Selection

The selection is based on 30-285 credits

Examiner

Håkan Jonsson

Course Aim

After the course, the student

1. shows great knowledge about the scientific foundation of the field of Computational Geometry in terms of the construction, presentation, and analysis of algorithms and data structures for geometric problems and an considerable degree of specialized knowledge in certain parts of the theory of algorithms;
2. demonstrates an extensive ability to identify, formulate and deal with complex algorithmic issues autonomously and critically and with a holistic approach;
3. demonstrates an ability to create, analyse and critically evaluate various algorithmic solutions, and an ability to plan and use appropriate methods to implement advanced algorithmic solutions within predetermined parameters and based on proven experience;
4. demonstrates an ability to present his or her own conclusions regarding solutions to algorithmic problems with a geometric flavour, and the knowledge and arguments on which they are based, in speech and writing to different audiences;
5. show insight into current research and development.

Contents

Examples of practical applications where algorithms and data structures from the field of Computational Geometry are applicable, like Robotics, Computer Graphics, VLSI-design, Virtual Reality, Geographical Information Systems (GIS), and Computer-Aided Design/Manufacturing (CAD/CAM).

The course covers the following theory: Polygons, triangulations, visibility, art gallery problems, convex hulls, Voronoi and Delaunay diagrams, proximity problems, point location search, arrangements of lines, hyper-planes; geometric duality, visibility graphs, shortest paths, motion planning, and intersection problems.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Lectures, mandatory programming assignments, projects and/or seminars. At some lectures it is the students that present their solutions to homework given after the regular lectures. Presenting and discussing solved solutions in the class gives a bonus that counts towards passing the final written exam. Solving homework is optional, but highly recommended, and also those that have not solved problems are welcome to join the discussions. The programming assignments aim at becoming familiar with the programming environment and get to know some primary scientific sources (journals and conferences). The project is about implementing a geometric algorithm/data structure and presenting it for the class.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

A final written exam with differentiated grades (goals 1 and 2), a project that must be completed in time (3 and 5) and presented (4).

Remarks

The course will not be given every year.

Overlap

The course D7013E is equal to SMD156

The course D7013E is equal to the old course SMD156.

Literature. Valid from Autumn 2012 Sp 1

Scientific papers.

de Berg, van Kreveld, Overmars och Schwartzkopf, Computational Geometry: Algorithms and Applications, 3rd edition.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Items/credits

Number	Type	Credits	Grade
0002	Project	4	U G#
0004	Written exam	3.5	G U 3 4 5

Study guidance

<http://www.sm.luth.se/csee/courses/d7013e/>

Last revised

by Jonny Johansson, HUL SRT 2012-03-12

Syllabus established

by the Department of Computer Science and Electrical Engineering 2007-12-17