



SF2565 Program Construction in C++ for Scientific Computing 7.5 credits

Programkonstruktion i C++ för tekniskt - vetenskapliga beräkningar

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The course syllabus is valid from Spring 2022 according to the school principal's decision:
S-2022-0529 Decision date: 2022-02-24

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mathematics, Technology

Specific prerequisites

English B / English 6

Single course students: 90 university credits including 45 university credits in Mathematics or Information Technology. English B, or equivalent.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The aim of the course consists of providing knowledge how advanced numerical methods and complex algorithms in Scientific Computing can be implemented in C++.

After completion of the course the students can

- Construct simple classes for often used mathematical objects;
- Create abstract classes and define simple template classes;
- Implement data structures for manipulating realistic geometry and complex grids for numerically solving partial differential equations;
- Optimize data structures and algorithms in C++ with respect to efficient computations for large-scale problems.

Course contents

- Object-oriented programming, basic notions in, and syntax of, C++
- Objects, classes and its definition, constructors and destructors
- Operators, operator overloading, polymorphism
- Basics of abstract classes, inheritance, generic programming
- Selected components of the C++ standard library
- Structured and unstructured grids, data structures for their implementation
- Implementation of numerical methods for partial differential equations
- Efficient implementation of numerical algorithms

Computer lab work and project tasks.

Examination

- PRO1 - Project, 3.5 credits, grading scale: P, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Tentamen (TEN1; 4 hp).

Projekt (PRO1; 3,5 hp).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.