Scientific programming for Engineers

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Frequency
Every year

Remarque
Every year / Next time: Fall 2019

Summary
The students will acquire a solid knowledge on the processes necessary to design, write and use scientific software. Software design techniques will be used to program a multi-usage particles code, aiming at providing the link between algorithmic/complexity, optimization and program designs.

Content
Object Oriented Paradigm
C/C++ and Python programming (class, operator, template, design patterns, STL)
Programming techniques, code factorization
Pointers, memory management, data structures
Linear system solving (Eigen library)
C++/Python coupling (pybind)
Post-treatment: Paraview, numpy/scipy, matplotlib

Classical problems: series calculations, solar system and many-body calculation, sparse linear algebra.

Note
A Linux laptop is required for this class

Keywords
programming, scientific, code design, algorithm, optimization, analysis

Learning Prerequisites
Required courses
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Important concepts to start the course
A Linux laptop is required for this class

Expected student activities
Exam: 4 evaluated homeworks