MATH-611 Scientific programming for Engineers

Anciaux Guillaume				
Cursus	Sem.	Туре	Language of	English
Civil & Environmental Engineering		Obl.	teaching Credits Session Exam	Linglion
Electrical Engineering		Opt.		4
Mechanics		Opt.		Project r
			Workload	120h
			Hours	56

Frequency

Every year

Remark

Next time: Fall 2023

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.

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

Learning Prerequisites

Required courses Basis in programming languages (C/Fortran) Basic Linux knowledge is required

Important concepts to start the course A Linux laptop is required for this class

Expected student activities

Exam: 4 evaluated homeworks



report

18

38

40

Lecture

Practical

work Number of

positions

Resources

Moodle Link

• https://go.epfl.ch/MATH-611