

Introduction to Scientific Computing Languages

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Tuesdays, 17.00-18.30

Thursdays, 17.00-18.30

Rogowski 115 (AICES seminar room)



Objectives

- Fast & easy prototyping → **Matlab, Mathematica**
- High-performance → **C, Fortran**

Syllabus

- **Numerical vs. Symbolic** computations
 - Floating point arithmetic
 - Conditioning of a problem
 - Fixed- and extended-precision numbers
- **Imperative vs. Functional** programming
 - Symbols, functions
 - Maps and iterations
 - Data & function visualization
- **Prototyping vs. High-performance**
 - Mathematical abstraction
 - Performance
 - Libraries for dense linear algebra



- 1 Programs & programming languages (intro)
- 2 Floating point numbers and arithmetic
- 3 **Matlab** (x3) – Matrix operations
- 4 **Mathematica** (x4) – Functional programming
- 5 Visualization
- 6 Performance
- 7 **C** (x2) – High-performance computations
- 8 Numerical libraries

Homeworks

- 5 assignments (individual & team)
Solutions presented in class
- Challenges: speed, elegance

Oral Exam

- **In English**
- Questions on the topics of the assignments
- Presentation & discussion of final project

Final Project

- Programming assignment, individual
- Choose your fav. language

- **In English**

- When: Thursdays 16.00-17.00
- Where: Rogowski 115, Schinkelstr. 2 (AICES)
- What: **Python, LLVM, Scala, Lua, ...**
- Followup: “High-performance Matrix Computation”
“Automatic Generation of Algorithms”

Course Guidelines

Lectures

Me – Bientinesi	You – Students

Me – Bientinesi	You – Students
Teach	Listen
Repeat & Clarify	Ask questions
Ask questions	Answer
Assign simple homeworks	Study & solve hws
Teach	DO NOT sleep!

Me – Bientinesi	You – Students
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Me – Bientinesi	You – Students
Listen	Teach
Ask questions	Clarify & Motivate
DO NOT sleep	DO NOT sleep