

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** → Style
High-performance → **C, Fortran** → Optimizations

Battles:

- **Numerical** vs. **Symbolic** computations
- **Imperative** vs. **Functional** programming
- **Prototyping** vs. **High-performance**



- 1 Floating point numbers and arithmetic
- 2 Programming languages
- 3 Programs: recursion, functions, variables, scope,...
- 4 **Matlab** – Matrix operations
- 5 **Mathematica** – Functional programming
Lists, replacement rules, pattern matching, functions. . .
- 6 Visualization
- 7 **C** (x2) – High-performance computations
- 8 Performance
- 9 Numerical libraries

Homeworks

- 4–5 assignments (individual & team)
Solutions presented in class
- Challenges: elegance, speed
- Winners: bonus

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Written Exam

- Before the end of the semester?
- **14 February 2013: 5pm**
- (14 March 2013: 5pm)
- Questions on the topics of the assignments
Matlab, Mathematica, C
- **In English**

Course Guidelines

Lectures

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Lectures

Me – Bientinesi	You – Students

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Teach	Listen

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Teach	Listen
Repeat & Clarify	Ask questions

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Assign simple homeworks	Study & solve hws

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Teach	DO NOT sleep!

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

- Course material: slides, . . .

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- Resources: Mathematica, C,...

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- HW correction

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- Questions?

Languages

- 1 Scala
- 2 Evolution of Fortran
- 3 Julia
- 4 Go

SW Engineering

- 1 Template metaprogramming (2x)
- 2 Prototype-based programming (1-2x)