

SYLLABUS:

# Informatica II

*Introduction to numerical methods and programming with R*

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The goal of this course is to introduce the students to computational tools and basic principles of programming. The course will be taught in English. At the end of the course they should be able to solve simple econometric, financial, or economic problems using data analysis and numerical methods. This course builds on the material presented in Matematica I and Matematica II, Statistica I and Informatica I including matrix calculus, function optimization, simulation, and solving nonlinear equations.

## 1 Material

### On the course page

- Slides, demo programs, diaries from PC lab
- Handouts, MATLAB-R guide
- Further reading: a few classical papers and useful stuff

### Other resources

- Web links (R), web links (data), books (see handout)
- R (free from [www.r-project.org](http://www.r-project.org))
- R studio (free from [www.rstudio.com](http://www.rstudio.com))
- R bloggers ([www.r-bloggers.com](http://www.r-bloggers.com))

### Learn R online\*

- Datacamp ([www.datacamp.com](http://www.datacamp.com))
- Codeschool([tryr.codeschool.com](http://tryr.codeschool.com))
- Coursera ([www.coursera.org/course/rprog](http://www.coursera.org/course/rprog))

\***Warning:** as it is open source, the R language is very fragmented!

## 2 System

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13:30-15:15	Class in A33	Recap of last class Discussion of homework Presentation of new concepts
15:30-17:15	PC lab 156	Guided tour Self-study and start of homework
Homework	Home or PC lab	Honor system Self-correction Really useful and necessary

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## 3 Program

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Week 1	A quick start to R (Interactive introduction to R) Basic elements of the R language: Variables, Vectors, Matrices, Operators Computer numbers
Week 2	Programs/scripts Programming style Functions
Week 3	Comparison operators Logical operators Flow control
Week 4	Loops
Week 5	A recap of the R language
Week 6	Numerical Algorithms
Week 7	Optimization
Week 8	Applications of linear algebra in econometrics
Week 9	Working with data I
Week 10	Working with data II
Week 11	Graphics
Week 12	An introduction to simulation
Week 13	R markdown Creation of a research workflow
Week 14	Recap and mock exam

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