

ECO 7938: Practical Computing in Economics

Syllabus

Instructor: Gunnar Heins

Email: gheins@ufl.edu

Office Hours: T & W, 10-11 in MAT 320

Class Meeting Times: M & W, 9th & 10th period (4:05 - 6:00) in **GER 228**

Half-semester course: Aug 22 - Oct 7.

Course Description

Computational skills have become more and more important in economics. This course serves as an applied and hands-on introduction to computing and data analysis for graduate students in economics and beyond. The goals of this class are to acquire basic programming skills as well as a working knowledge of two of the most commonly software packages (R and Matlab), to practice working with and analyzing data, and to become familiar with commonly used datasets. This course further provides an introduction to numerical optimization, dynamic programming, and UF's computing resources.

Software and Prerequisites

This course will use two programming languages: R during the first half and Matlab during the second one. Prior knowledge of either is not necessary but certainly helpful. Please download and install both R and RStudio (a user interface for R) before the first session. R can be downloaded from <https://www.r-project.org/> and RStudio from <https://www.rstudio.com/>.

Please bring your laptop to each session and have it ready at the beginning of each class. I will for the most part be writing code live in R and Matlab during each lecture and you should follow and understand each step by performing it yourself. The classroom has plugs and you will be able to charge your laptop during the session.

Textbooks and Readings

The course will build on multiple sources and does not follow a single textbook, especially for the second part. For the first part, I highly recommend the book by Norman Matloff

”The Art of R Programming - A Tour of Statistical Software Design”, on which the first lectures will be based. It is useful as an introduction to R but also illustrates quite detailed how R functions compared to other languages.

For the basics of Matlab, I recommend the book by Stormy Attaway ”Matlab - A Practical Introduction to Programming and Problem Solving”.

Exams, Homework, and Grading

Homeworks are an important part of this class and essential in order to learn and practice programming. Especially if you have no or little experience you should use the problem sets as practice for the exams, future courses and ultimately your research. There will be weekly homeworks which have to be submitted individually. You can discuss your solutions with others, but do not take over someone else’s code.

There will also be a Midterm and a Final exam. The Final will be a take-home exam and you will be asked to replicate an empirical economics paper using the skills you learned in class and the problem sets. The midterm will be in class during the 4th week. The final grade will consist of:

Problem Sets	30 %
Midterm	30 %
Final	40 %
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Total	100 %

If you require special accommodation during exams or class for any reason, please let me know early.

Student Responsibility

Enrollment in this course constitutes acknowledgement of the following:

- 1) I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action, up to and including expulsion from the University.
- 2) I will adhere to university copyright policies as found at <http://www.uflib.ufl.edu/admin/Copyright.htm>.

3) Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Tentative Course Schedule

PART I: PRACTICAL COMPUTING IN R

Week 1

Session 1 (Aug 22):

Course Introduction, Outline, R and R Studio, Introduction to R, Install Packages, A first R session, Vectors in R

Session 2 (Aug 24):

Loops, Matrices and Lists in R

Homework 1

Week 2

Session 3 (Aug 29):

Importing and saving data, Data Tables, Summary statistics, Merging datasets

Session 4 (Aug 31):

Introduction to Regression Analysis, `lm()`, Standard Errors

Homework 2

Week 3

Session 5 (Sep 7):

Advanced Data Analysis, Simulation, Bootstrap

Homework 3

Week 4

Session 6 (Sep 12):

Exporting Results, Plots & Data Visualization, useful R packages

Session 7 (Sep 14):

Midterm

PART II: PRACTICAL COMPUTING IN MATLAB

Week 5

Session 8 (Sep 19):

Introduction to Matlab, Differences to R, a first Matlab session

Session 9 (Sep 21):

Matrices, Loops, and Functions in Matlab

Homework 4

Week 6

Session 10 (Sep 26):

Matrices, Loops, and Functions in Matlab (cont.), Introduction to Numerical Optimization and Dynamic Programming

Session 11 (Sep 28):

Introduction to Numerical Optimization and Dynamic Programming (cont.)

Homework 5

Week 7

Session 12 (Oct 3):

Introduction to Numerical Optimization and Dynamic Programming (cont.)

Session 13 (Oct 5):

Speeding up your code, UF's computing resources, HiPerGator

Homework 6

Week 8

Session 14 (Oct 10):

Wrap-up and Review

Session 15 (Oct 12):

Final Exam