Economics 410 Syllabus
Computational Economics
Winter 2012

Course Instructor: Assia Ezzeroug

Course Prerequisite
Mathematics for Economics (___)
Intermediate Macroeconomic Theory (___)

Course Description
This course is a graduate-level introduction to the most commonly used computational tools for conducting numerical analysis of dynamic economic models. As most complex dynamic models used in modern economic research do not have analytical (closed-formed) solutions, it is becoming essential to be equipped with solution methods that allow researchers to solve for their models numerically with an acceptable level of accuracy and precision. In this course a basic RBC model will be used as a framework upon which various methods are applied to obtain its solutions, namely the value function-based methods and the Euler condition-based method. To enable a thorough understanding of such methods, relevant topics in numerical analysis are reviewed. More general methodologies to solve linear rational expectations models will also be taught. Finally, with time permitting, a short introduction will be made on DSGE model, its extensions, and computational issues confronted by the heterogenous-agent model.

By the end of this course students will be equipped with a wide knowledge of the most useful computational tools used in macroeconomics and understand the importance of computational economics in research.

Course Materials

There is no required text for this course. The lecture notes are fully self-contained. However students are encouraged to pick up relevant readings in the following texts:

Jerome Adda, Russell Cooper (2003), Dynamic Economics, quantitative methods and applications, MIT Press.

Ljungqvist and Sargent (2000), Recursive Macroeconomic Theory, 2nd edition, MIT.

Kenneth L. Judd (1994), Numerical Methods in Economics, MIT Press.

Tauchen (1986), “Finite State Markov Chain Approximations to Univariate and Vector Autoregressions,” *Economic Letters* 20, 177-181.

Course Assessment

Homework: there will be three homeworks accounting for 50% of the final grade.
Exams: one final exam, comprising 50% of the final grade.

Course Schedule

Week 1 and 2	Chapter 1 - Introduction to Computational Economics Review of RBC Topics in numerical analysis Dynamic programming **Homework Set 1**
Week 3 and 4	Chapter 2 – Solution Methods I Linear-quadratic Discrete State Space Log-linearization
Week 5 and 6	Chapter 3 – Solution Methods II Perturbation method Projection method **Homework Set 2**
Week 7 and 8	Chapter 4 – Solution Methods III Value function iterations Policy function iterations
Week 9 and 10	Chapter 5 – DSGE and Extensions **Homework Set 3**

FINALS WEEK