Quantitative methods in macroeconomics Summer 2011 Syllabus

 $({\rm April}\;5,\,2011)$

Instructor: Günter W. Beck Hlderlinstrasse 3, H-B 5418

Office hours: On appointment

Teaching assistant:

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Lectures: Tuesday, 12.00 a.m. - 2.00 p.m. Room: H - H-A 3102

Classes:

Friday, 10 a.m. - 12 a.m. Room: H - H-B 6414 First class: April 15, 2011

Website:

t.b.a.

Content:

This course is designed to introduce students to recent developments in macroeconomics. Students will learn how to formulate and solve stochastic dynamic economic models and to apply these techniques to a number of substantive issues in business cycle theory, consumption, asset pricing, investment, and employment.

An important part of the course will be concerned with basic tools and concepts of dynamic stochastic economic theory. We will study tools like difference equations, dynamic programming and Markov chains. We will also write simple computer programs to help us solve and understand the properties of economic models that are often too complicated to be analyzed analytically. A detailed course outline is given below.

Course requirements:

Students will be graded upon the following:

• Final exam (80%).

Readings

The main references for the course are:

Adda, Jerome and Cooper, Russell, (2003), Dynamic Economics, MIT Press. (AC)

de la Fuente, Angel (2000), Mathematical methods and models for economists, Cambridge University Press, Cambridge. (FU)

Heer, Burkhard, and Maussner, Alfred, (2005), Dynamic General Equilibrium Modelling, Springer. (HM)

Miranda, Mario J. and Paul L. Fackler, 2002, Applied Computational Economics and Finance, MIT press (MF)

Romer, David (2001), Advanced macroeconomics, McGraw Hill. (RO)

Course outline:

- 1. 'Economic' topics
- (a) Stylized facts of growth and business cycles
- (b) Solow model

RO, ch. 1.

(c) The deterministic optimal growth model

HM, ch. 1.2, AC, ch. 5.2, RO, ch. 2.

 $(d)\ {\bf The\ stochastic\ optimal\ growth\ model}$

HM, ch. 1.3, AC, ch. 5.3, RO, ch. 2.

- (e) The stochastic optimal growth model with endogenous labor supply HM, ch. 1.4, AC, ch. 5.4, RO, ch. 2.
- (f) Consumption and asset pricing AC, ch. 6, RO, ch. 7.

(g) **Investment**

AC, ch. 8.

... and if there is time

- (h) **Employment** AC, ch. 9.
- (i) Search models

AC, ch. 10.6.

(j) Nominal price rigidities and the new Keynesian Phillips curve HM, ch. 2.4.3.

2. 'Methodological' Topics

(a) **HP filter**

HM, ch. 9.4.

- (b) A quick refresher in differential calculus FU, ch. 4.
- (c) Function approximation HM, ch. 8.2.
- (d) Lagrange and Kuhn-Tucker Problem HM, ch. 1.1.2, FU, ch. 7.
- (e) Linear and non-linear difference equations HM, ch. 9.1, FU, ch. 9.
- (f) A quick refresher in linear algebra HM, ch. 8.1.
- (g) System of difference equations HM, ch. 9.1, FU, ch. 10.
- (h) **Deterministic dynamic programming** HM, 1.2, AC, ch. 2 and 3, FU, ch. 12.
- (i) Stochastic dynamic programming HM, 1.3, AC, ch. 2 and 3, FU, ch. 12.
- (j) Markov processes HM, ch. 9.2.

3. Software

(a) Introduction to Matlab

Manual available at http://www.maths.dundee.ac.uk/ ftp/na-reports/MatlabNotes.pdf.