

Topics in Macroeconomics (Optional Course)

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Lectures: Thu 9-11am & Fri 11am-1pm (ECO-02 / Computer Lab)

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Course Description

This course consists of a selection of topics which have received significant attention by macroeconomists and policymakers in recent times. The course is divided into two distinct but inter-related parts:

1. Computational tools
2. Theoretical foundations

For part 1, we will cover computational techniques like *Dynamic Programming* and *Numerical methods*, as well as using programming languages on a computer. The course will provide hands-on training on several programming languages which are used widely by contemporary macroeconomists, including *MATLAB*, *Python* and *Julia*, and how to use them to solve and simulate macroeconomic models. For part 2, the emphasis shall be on formal models, especially some of the workhorse models in contemporary macroeconomics. After completing this course, the students will gain an understanding of not only theoretical but also empirical as well as policy discourse in this area, and will also be in a position to explore further in an area of their choice.

A brief outline of the course and reading list is provided below. Note that the *starred readings* are optional.

Course Outline

1 Computational Techniques

1.1 Introduction to Programming

- Introduction to coding and programming languages, simple numerical exercises using spreadsheets, algorithm & pseudocodes.

- Introduction to Python, using Jupyter Lab / Notebook and Spyder. Setting up your Python environment. Using Scientific Libraries in Python: NumPy, Matplotlib, SciPy, Numba, Parallelization, Pandas etc.
- Introduction to MATLAB / GNU Octave.
- Introduction to Julia, using Julia REPL and Jupyter Notebook.
- Using scripts, functions, structures and classes. Introduction to Object Oriented Programming.
- Linear algebra & symbolic computation, simple plots, importing and handling macroeconomic data, probability distributions, numerical solutions to differential equations (Runge-Kutta method) and various differential equation solvers, numerical simulation of deterministic and stochastic growth models (in MATLAB and Python), dynamic programming, introduction to Dynare (time permitting).

Readings: [Sargent and Stachurski's Python lectures](#), MATLAB & Dynare User guides, [*Perla, Sargent and Stachurski's Julia lectures](#), [*Stachurski \(2009\)](#), [*Novales, Fernández, and Ruiz \(2014\)](#).

1.2 Dynamic Programming

Dynamic programming, Bellman equation and policy functions, introduction to stochastic processes and Markov chains, optimal stopping problems, stochastic dynamic programming.

Readings: Lecture slides / notes, Adda and Cooper (2003) chapt. 2, [*Ljungqvist and Sargent \(2012\)](#) chapt. 2 & 3.

2 Theoretical Foundations to Contemporary Macroeconomics

2.1 Introduction

A brief review of a few important developments in contemporary macroeconomics: growth and business cycles, income distribution.

Crusoe problem, global financial crisis, scarcity of safe assets.

Readings: Lecture slides / notes, Uribe and Schmitt-Grohé (2017) Chapt. 1, Cooley (1995) Chapt. 1, Caballero, Farhi, and Gourinchas (2016) and Caballero, Farhi, and Gourinchas (2017).

2.2 Basic RBC / DSGE Model

Recursive methods (in deterministic & stochastic models), stochastic growth model with labor-leisure choice: Arrow-Debreu equilibrium vs. recursive competitive equilibrium, log-linearization techniques, linear quadratic dynamic programming and the method of Kydland & Prescott (time permitting), stationary and non-stationary equilibrium dynamics, inducing stationarity, moving from theory to data, calibration (brief discussion only), Hodrick-Prescott filter, limitations and critiques of equilibrium theories.

Readings: Lecture slides / notes, Adda and Cooper (2003) chapt. 5, Cooley (1995) chapt. 1, Uribe and Schmitt-Grohé (2017) chapt. 4, [*McCandless \(2008\)](#) chapt. 4 to 7, Summers (1990), [*Kydland and Prescott \(1982\)](#), [*King and Rebelo \(1999\)](#).

2.3 Incomplete Markets

Incomplete markets, uninsured idiosyncratic risks, heterogeneous agents.

Readings: Lecture slides / notes, [*Aiyagiri \(1994\)](#), [*Benhabib, Bisin, and Zhu \(2015\)](#).

2.4 Imperfect Competition, Imperfect Information, Money and Nominal Rigidities

Imperfect competition (Dixit-Stiglitz framework); imperfect information: signal extraction and nominal sluggishness; nominal rigidities: introduction of non-Walrasian features.

Readings: Lecture slides / notes, Bénassy (2011) chapt. 12 & 13, *Novales, Fernández, and Ruiz (2014) chapt. 8.

2.5 New Keynesian Model

Setting up the basic New Keynesian Model.

Readings: Lecture slides / notes, Galí (2008) chapt. 3.

2.6 Search and Matching in Labor Market

Introduction to Mortensen-Pissarides model: matching function, job creation, Beveridge curve, wage determination.

Readings: Lecture slides / notes, Pissarides (2000) chapt. 1.

2.7 Open Economy Macroeconomics & International Finance

Efficiency of capital markets, arbitrage and speculative trading, market microstructure, limits of arbitrage, scarcity of safe assets.

Readings: Lecture slides / notes, Krugman, Melitz, and Obstfeld (2018), Bekaert and Hodrick (2012) (selected sections), *Fama (1970), *Baba and Packer (2009), *Akram, Rime, and Sarno (2008), Kocherlakota (2008).

2.8 Models of Demand-led Growth

Harrodian and post-Keynesian models: investment function and debates around it, role of income distribution, endogeneity of money, stock-flow consistent models.

Readings: Lecture slides / notes, Blecker (2002), Lavoie (2014) chapt. 6, *Kurz and Salvadori (2011), *Skott (2011).

2.9 Behavioral Macroeconomics & Finance

Departure from rational expectation hypothesis: limits to cognitive abilities, simple models with heuristics, limits of arbitrage, heterogeneous agents: fundamentalists vs. chartists, applications in foreign exchange markets.

Readings: Lecture slides / notes, Grauwe (2012) chapt. 1, *Shleifer and Vishny (1997), *Chiarella, He, and Zheng (2013).

Evaluation

For M.A. students only

- Presentation (40%): The students pick a paper or a sub-topic/model which is not covered in the class. This paper or topic should ideally be from a list to be circulated in the class, though related topics or papers outside this list also might be chosen in consultation with me. The topic for presentation must be communicated by a date to be announced in the class. *It shall be compulsory for ALL to attend ALL the presentations.* (For students who are unable to be physically present in the University due to visa-related issues, presentation / participation shall be through online mode.)

- Software-based assignment / project (20%).
- End-semester examinations (40%): Open-book examination based on the papers and topics covered in class.

For Ph.D. students TBA.

References and Further Readings

- Adda, Jérôme and Russell Cooper (2003). *Dynamic Economics*. Cambridge, Massachusetts: MIT Press.
- Aiyagiri, S. Rao (1994). "Uninsured Insurance Risk and Aggregate Saving". In: *The Quarterly Journal of Economics* 109.3, pp. 659–684.
- Akram, Farooq, Dagfinn Rime, and Lucio Sarno (2008). "Arbitrage in the foreign exchange market: Turning on the microscope". In: *Journal of International Economics* 76, pp. 237–253.
- Baba, Naohiko and Frank Packer (2009). "From turmoil to crisis: Dislocations in the FX swap market before and after the failure of Lehman Brothers". In: *Journal of International Money and Finance* 28.8, pp. 1350–1374.
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- Blecker, Robert (2002). "Distribution, Demand and Growth in Neo-Kaleckian Macro-Models". In: *The Economics of Demand-Led Growth*. Edward Elgar Publishing. Chap. 8, pp. 129–152.
- Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas (2016). "Safe Asset Scarcity and Aggregate Demand". In: *American Economic Review* 106.5, pp. 513–18.
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- King, Robert G. and Sergio T. Rebelo (1999). "Resuscitating Real Business Cycles". In: *Handbook of Macroeconomics*. Ed. by J.B. Taylor and Michael Woodford. Vol. 1. Elsevier Science B.V.
- Kocherlakota, Narayana (2008). "Injecting Rational Bubbles". In: *Journal of Economic Theory* 142, pp. 218–232.
- Krugman, Paul R., Marc J. Melitz, and Maurice Obstfeld (2018). *International trade: theory and policy*. Pearson.
- Kurz, Heinz D. and Neri Salvadori (2011). "The post-Keynesian theories of growth and distribution: a survey". In: *Handbook of Alternative Theories of Economic Growth*. Edward Elgar Publishing Ltd.
- Kydland, Finn E. and Edward C. Prescott (1982). "Time to Build and Aggregate Fluctuations". In: *Econometrica* 50.6, pp. 1345–1370.
- Lavoie, Marc (2014). *Post-Keynesian Economics: New Foundations*. Edward Elgar Publishing Ltd.
- Ljungqvist, Lars and Thomas J. Sargent (2012). *Recursive Macroeconomic Theory*. third. Cambridge, Massachusetts: MIT Press.
- McCandless, George (2008). *The ABCs of RBCs: An introduction to dynamic macroeconomic models*. Cambridge, Massachusetts: Harvard University Press.

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- Pissarides, Christopher A. (2000). *Equilibrium Unemployment Theory*. 2nd. MA: MIT Press.
- Setterfield, Mark (2011). *Handbook of Alternative Theories of Economic Growth*. Edward Elgar Publishing Ltd.
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- Summers, Lawrence H. (1990). "Some Skeptical Observations on Real Business Cycle Theory". In: *Federal Reserve Bank of Minneapolis Quarterly Review*.
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