

# Macroeconomics II

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## Course Description

This course contains a basic set of tools and models in macroeconomics, required to either take up more advanced courses in macroeconomics or to follow the standard contemporary literature in other areas of economics. The emphasis is on formal models. At the end of this course, the students will be in a position to study some of the more advanced workhorse models in the contemporary macroeconomics and development economics discourse in the following semesters.

## Course Outline

### 1 Introduction and Essential Tools\*

Broad overview of contemporary macroeconomic theory, confronting macroeconomic data, alternative approaches to macroeconometrics.

Setting up a general optimal control problem: state and control variable.

Solution using Pontryagin's Maximum Principle (in continuous time): Free-endpoint vs. fixed endpoint problems, finite and infinite horizon, problems using discounting (current-valued Hamiltonian).

Dynamic Programming using Bellman's equation: dynamic cake-eating problem under finite and infinite horizon, solving through direct (sequence) approach vs. dynamic programming, construction of Bellman's equation and policy function.

Introduction to macroeconomic time-series: Simple stochastic processes, stationarity, mean reversion and impulse response, Markov chains.

Computer Lab Sessions: Introduction to MATLAB as computational software and programming languages, simple numerical and symbolic computations using MATLAB.

### 2 Simple Aggregate Models

Dynamic models of output and inflation, introduction to expectations: adaptive vs. rational expectations, Cagan's model under adaptive and rational expectations, policy effectiveness/ineffectiveness, Lucas critique, problems with traditional aggregate models and rise of microfoundations in modern macroeconomics, fundamental solutions, rational bubbles and sunspots, learning under rational expectations.

### 3 Contingent Markets and Asset Pricing

Introduction to uncertainty and financial assets, complete vs. incomplete markets, Arrow-Debreu securities, time 0 vs. sequential trading, Arrow-Debreu Equilibrium with complete markets, insurance, introduction to asset pricing under complete and incomplete markets, equity premium and risk-free rate puzzle, capital asset pricing model (CAPM), efficient markets hypothesis (EMH).

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\*Not for exam. These topics will be covered in class as and when they are required.

## 4 Optimal Growth Models

Recap of neoclassical growth model with constant savings rate (Solow-Swan) model: a few problems and way forward.

Optimal growth with single dynasty under infinite horizon: Decentralized market equilibrium, comparison with the solution to social planner's problem, efficiency of decentralized market equilibrium, introducing government and Ricardian equivalence.

Two-period overlapping generations model: Decentralized market equilibrium, comparison with social planner's problem, inefficiency of decentralized market equilibrium, golden rule of capital accumulation, pension - fully funded vs. pay-as-you-go (PAYG) system.

Numerical solution to growth models (Solow-Swan, Ramsey-Cass Koopmans and OLG) in discrete time using simple spreadsheets and MATLAB (time-permitting).

## 5 Introduction to Money

Models of money as a medium of exchange and as store of value, fragility of OLG money, money in the utility function (MIUF) models, cash-in-advance (CIA) models, search in money market.

## 6 Open Economy Macroeconomics

Balance of payments, introduction to small open economy, dynamics of small open economy in finite and infinite horizon, bankruptcy, stochastic current account model, Arrow-Debreu securities in international finance, international financial markets under complete markets, two-country models under complete markets, limitations of the simple model, simple models of exchange rate dynamics.

## Readings

### Main Texts

Jean-Pascal Bénassy, *Macroeconomic Theory*, Oxford University Press, 2011.

Martín Uribe & Stephanie Schmitt-Grohé, *Open Economy Macroeconomics*, Princeton University Press, 2017.

Maurice Obstfeld & Kenneth Rogoff, *Foundations of International Macroeconomics*, The MIT Press, 1996.

Alfonso Novales, Esther Fernández & Jesús Ruiz, *Economic Growth: Theory and Numerical Solution Methods, Second Edition*, Springer, 2014.

### For Mathematical Tools

Jérôme Adda & Russell Cooper, *Dynamic Economics: Quantitative Methods and Applications*, MIT Press, 2003.

M. Hoy, J. Livernois, C. McKenna, R. Rees & T. Stengos, *Mathematics for Economics*, Second Edition, MIT Press, 2001.

## Evaluation

Assignment: 10%, Mid-semester Examination: 45% ; End-semester Examination: 45%.