Syllabus - ECON60201-01

Macroeconomic Theory I (First-year PhD Macro) **Instructor: Rüdiger Bachmann**
Fall term 2022   **Office: Jenkins Nanovic Hall 3026**
Email: rbachman@nd.edu
Lecture: Mon/Wed 9:45am-11:45 am   **Jenkins Nanovic Hall 3005**
Tutorial: Tue 5:05 pm-6:20 pm   **De Bartolo Hall 143**
Dropbox folder for class:
**https://www.dropbox.com/scl/fo/of2dyua0aorzg5e9csklv/h?dl=0&rlkey=83395v1aecqt8n05l3lr
whxno**
Zoom Link for class:
**https://notredame.zoom.us/j/99037705686?pwd=RWJtREtGUTFKSWNEUDMrUHV4ZjZrdz
09**
Office hours: **by appointment**

Description:

This class is an introduction to modern macroeconomics. As such, it is very tools-focused. It is part of a year-long introductory lecture on macroeconomics, the second half of which will be taught in the spring semester.

While this class – like every modern economics PhD program in the world – emphasizes theory and tools (so-called workhorse models), we also stress the applied and data-driven character of most current research in macroeconomics, perhaps a bit more than other programs.

Following this premise, we start with an extensive study of macroeconomic data and discuss simple practical tools to describe and analyze them.

Then we move towards macroeconomic model building; in this first half mostly in a partial equilibrium environment in order to highlight basic economic mechanisms: consumption, asset pricing, investment and the labor market. The class finishes with general equilibrium and an introduction into long-run analysis with the Solow growth model and the infinite-horizon neoclassical growth model. The spring semester will then use modified versions of these general equilibrium models to study business cycles, the role of money, nominal rigidities and monetary and fiscal policy. Along the way, we introduce many technical tools that macroeconomic researchers use: filters, vector autoregressions, Markov chains, dynamic programming, optimal control, calibration, perturbation methods, etc.

Over the whole year, we stress five elements that are important to modern macroeconomics: (i) macroeconomic data, (ii) use of models, (iii) microfoundations, (iv) dynamic, intertemporal decision making often under uncertainty and the role of expectations, and (v) the interdependence of individual decision-making and macroeconomic phenomena.

It should be noted that in this class, despite being a PhD course in macroeconomics, we still make lots of simplifying assumptions that are unrealistic or might appear out of touch with reality, such as representative agents, complete markets, rational expectations, few to no frictions, etc. Yet matters are complicated, so the student of macroeconomics has to start somewhere. While close to the state of the art in terms of many ideas and principles, this course is not necessarily representative of the research *frontier* in macroeconomics. For example, we will not be able to talk much about problems of heterogeneity, incomplete markets and all the possible frictions that macroeconomic researchers are currently studying (this is what second-year courses are for).

Goals:

After the class, the students should be able to read current macroeconomic research papers and have the tools available to replicate such research. They should also be prepared for the more research-oriented second-year classes in macroeconomics that will help them develop their dissertation topics.

Given that this is a tools-focused class, students will need to learn a mathematical programming language, for which I recommend Matlab. This is the language I have used in my research and will be able to give some support for. If you like other, similar programs, better, like Julia for example, that is fine, too.

Study Material:

There is no single assigned textbook for this class. Instead, students will receive self-contained sets of lecture slides, which draw on chapters from various standard textbooks:

- *Advanced Macroeconomics* by David Romer
- *Recursive Macroeconomics Theory* by Lars Ljungqvist and Thomas Sargent
- *Recursive Methods in Economic Dynamics* by Nancy Stokey and Robert Lucas with Edward Prescott
- *Lectures on Macroeconomics* by Olivier Blanchard and Stanley Fisher

I will point out during the semester more specific additional reading sources. The *Handbook of Macroeconomics* (https://www.sciencedirect.com/handbook/handbook-of-macroeconomics/volumes) in both volumes is also a great way to get a good introduction and overview of a specific topic. The first volume is about more classical topics such as the ones we will discuss in this class, while the second volume is more about recent developments in the field and the current research frontier.

Grades:

There will be 8 problem sets throughout the semester. While students may consult with one another in completing the problem sets (in fact, they are encouraged to do so), it is expected that each student turn in his/her own assignment. Students are asked to submit their assignments directly into our class Dropbox folder by the date and time stated at the top of each problem set (typed solutions are preferred, otherwise you have to use a scanner).

The submitted solution file has to be in PDF format and be named: PSX_lastname (X being the arabic number of the problem set).

The exact due dates and times for the problem sets will be determined as we progress through the semester. The problem sets will be graded on a check plus, check, check minus system. There will be suggested solutions. I do reserve the right to grade with zero, if no solution or mostly gibberish is handed in.

There is an in-class midterm after chapter 2 on consumption (the exact date is to be determined). There is an in-class final on our last day of classes: December 7th (you can ignore the date assigned by the registrar).

Grade value of each assignment:

Problem sets:	10 percent
Midterm:	40 percent
Final:	50 percent

Contact/Communication:

Email: rbachman@nd.edu

Dropbox folder for class:
**https://www.dropbox.com/scl/fo/of2dyua0aorzg5e9csklv/h?dl=0&rlkey=83395v1aecqt8n05l3lr
whxno**

Office hours: They are by appointment. They can be in person or online via Zoom. The best way is to email me first, in order to converge on a date and time. For Zoom meetings, we will use the official class Zoom room.

Homepage: http://www3.nd.edu/~rbachman/
Twitter: https://twitter.com/BachmannRudi

Tutorial:

Instructor: Xinyi Li

I strongly recommend making use of the tutorial. The start date is August 30th. It serves three main purposes: 1) to ask any questions left over from lecture (it is recommended that students ask their immediate questions in lecture but sometimes additional questions arise later, and, while you should feel comfortable to set up an office appointment or a Zoom call with me to discuss them, the tutorial is meant to provide additional resources to help with questions); 2) to discuss issues that might come up with the ongoing problem set, although the tutorial instructor will not solve the problem set for you; 3) to discuss common mistakes made on the previous problem set.

Dates where I cannot be in town:

September 12	meeting on August 23, 3-5 pm
September 14	meeting on August 30, 3-5 pm
September 26	Zoom taught
September 28	Zoom taught
October 12	meeting on September 6, 3-5 pm
October 26	Midterm, proctored by Xinyi
November 14	meeting on December 6, 3-5 pm
November 16	Zoom taught
November 28	meetings on November 21, 9-11 am and 11:30-1:30 pm
November 30	Zoom taught

1. **Macroeconomic Data and Simple Data Description Tools**
    a. Importance of data for macroeconomics
    b. Sources of macroeconomic data
    c. Traditional business cycle peak-trough analysis, Bry Boschan procedure
    d. Filters
    e. The four canonical second moments: volatility, autocorrelation, correlation, dynamic cross-correlations
    f. Business cycle facts
    g. Higher moments and time-varying (second) moments
    h. Reduced-form VARs as data description tools
    i. SVARs, the identification problem and canonical solutions, Choleski, Long-run restrictions, sign restrictions
    j. AR processes and their approximation by Markov chains, properties of Markov chains

2. **Consumption**
    a. The canonical consumption-saving model under certainty and PIH
    b. Consumption under uncertainty, Random-Walk Hypothesis and Precautionary Saving
    c. Dynamic Programming
    d. Asset pricing (consumption CAPM, Lucas trees and stocks, the Arrow-Debreu economy)

MIDTERM

3. **Investment**
    a. The frictionless neoclassical investment model, user costs of capital
    b. Q-theory, smooth-convex adjustment costs
    c. Optimal control, Hamiltonians
    d. Time permitting: Real options theory of investment and non-convex adjustment costs

4. **Labor Market and Unemployment**
    a. Neoclassical labor supply and labor demand
    b. Search and matching: intertemporal search, an island model, DMP model

5. **The Long-run**
    a. The Solow growth model
    b. The neoclassical growth model
        i. As a planner's problem
        ii. As a decentralized economy