

NEW YORK UNIVERSITY
Department of Economics

Econ-GA 3002 – RECENT RESEARCH ON RISK, UNCERTAINTY AND VALUE
Syllabus – Fall 2019

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COURSE OBJECTIVES

This course has two goals: (1) To teach students the tools of modern macroeconomics, and (2) To apply these tools to some classic economic problems, e.g., saving and wealth dynamics, asset pricing, and optimal policy design. Although the tools we cover were developed in the 19th and 20th centuries, we shall show that by appropriately modifying them, they continue to provide foundations for 21st century macroeconomics.

The only way to learn macroeconomics is to do it. Students will therefore be asked to ‘get their hands dirty’ by writing/modifying simple Python (or Julia) programs that implement the ideas discussed in class. Fortunately, the QuantEcon site (www.quantecon.org) makes this very easy. You don’t need to be an experienced programmer to use this site. If you have never used Python or Julia, then you will become a competent novice within a matter of days. The introductory online lectures provide a step-by-step guide into the world of open-source/interactive programming.

COURSE EVALUATION

	<u>Weight in Grade</u>
Programming Assignments	– 70 %
Class Presentation	– 30 %

COURSE MATERIALS

There is no required textbook for this course. However, we will draw on material from the following books:

- Ljungqvist & Sargent (4th ed), *Recursive Macroeconomic Theory (RMT)*
- Hansen & Sargent (2012), *Recursive Models of Dynamic Linear Economies (DLE)*
- Hansen & Sargent (2008), *Robustness (ROB)*
- Sargent (1999), *The Conquest of American Inflation (Conquest)*
- Hansen & Sargent (in progress), *Risk, Uncertainty and Value (RUV)*

Students will find it convenient to have access to these books. In addition, a number of journal articles and notes will be posted on the class website.

COURSE OUTLINE AND READINGS

I. BACKGROUND

- Sept. 3 – **Introduction and Overview**
Hansen (2014), “Nobel Lecture: Uncertainty Outside and Inside Economic Models”
Sargent (2004), “Autoregressions, Expectations and Advice”
RMT Chapt. 1
RUV Chapt. 1
Key Ideas & Concepts: *Model Uncertainty, Model Averaging, Martingales & Belief Distortions, Bayesian vs. Max-Min Decision Theory, Lucas Critique*

II. SINGLE/REPRESENTATIVE AGENT LQG CONTROL & FILTERING

- Sept. 10-24 – **No Uncertainty**
RMT, Chpts. 2, 5 & 12 (App. A)
DLE, Chpts. 3-5, 8, 11
Anderson, Hansen, McGrattan & Sargent (1996) (or *ROB*, Chpts. 4-5)
Villaverde et. al. (2007), “ABCs (and Ds) of Understanding VARs”
Campbell & Deaton (1989), “Why Is Consumption So Smooth?”
Quah (1990), “Permanent and Transitory Movements in Labor Income...”
Guvenen (2007), “Learning Your Earning: Are Labor Income Shocks...?”
Blanchard et. al. (2013), “News, Noise, and Fluctuations: An Empirical Exploration”
Key Ideas & Concepts: *Certainty Equivalence, Riccati Equations, Innovation Representations, Invariant Subspace Methods, Duality Between Control & Filtering*
- Oct. 1-15 – **Robust Control & Filtering**
ROB, Chpts. 1-3, 9-10
Hansen & Sargent (2011), “Wanting Robustness in Macroeconomics”
Hansen, Sargent, & Tallarini (1999), “Robust Permanent Income & Pricing”
Hansen & Sargent (2019), “Structured Uncertainty and Model Misspecification”
Hansen & Sargent (2019), “Macroeconomic Uncertainty Prices when Beliefs are Tenuous”
Key Ideas & Concepts: *Ellsberg Paradox, Relative Entropy, Chernoff Entropy, Detection Error Probability, Legendre Transform Duality Between Risk-Sensitivity & Robustness, Modified Certainty Equivalence*

III. RAMSEY/STACKELBERG PROBLEMS & DYNAMIC PROGRAMMING-SQUARED

- Oct. 22-29 – **No Uncertainty**
RMT, Chpts. 19-20
Sargent & Velde (1999), “Optimal Fiscal Policy in a Linear Stochastic Economy”
Sargent & Evans (2013), “History-Dependent Public Policies”
Bhandari, Evans, Golosov & Sargent (2017), “Fiscal Policy & Debt Management...”
Key Ideas & Concepts: *Time Inconsistency, History-Dependence, Lagrange Multipliers as State Variables*

- Nov. 5-12 – **Robust Pareto/Ramsey Problems**
Hansen & Sargent (2012), “Three Types of Ambiguity”
Colacito, Croce & Liu (2019), “Recursive Allocations and Wealth Distribution...”
Bhandari (2015), “Doubts, Asymmetries & Insurance”
Key Ideas & Concepts: *Endogenous Pareto Weights, Endogenous Heterogeneous Beliefs*
- Nov. 19 – **Credible Policies and APS**
RMT, Chpts. 24-25
Conquest, Chpt. 4
Key Ideas & Concepts: *Subgame Perfection, Reputation, Strategies vs. Continuation Values*

IV. ADAPTIVE LEARNING & SELF-CONFIRMING EQUILIBRIA

- Nov. 26 – **Agents as Econometricians**
Bray & Kreps (1987), “Rational Learning & Rational Expectations”
Marcet & Sargent (1989), “Convergence of Least-Squares Learning Mechanisms...”
Hansen (2007), “Beliefs, Doubts, and Learning”
Key Ideas & Concepts: *Mean ODE, E-Stability*
- Dec. 3 – **Self-Confirming Equilibria**
Sargent (2008), “Evolution and Intelligent Design”
Fudenberg & Levine (2009), “Self-Confirming Equilibrium & the Lucas Critique”
Conquest, Chpts. 1, 6-7
Key Ideas & Concepts: *Perceived Law of Motion, Off-Equilibrium-Path Events*
- Dec. 10 – **Learning Dynamics**
Conquest, Chpts. 8-10
Adam, Marcet & Nicolini (2016), “Stock Market Volatility and Learning”
Cho & Kasa (2015), “Learning and Model Validation”
Key Ideas & Concepts: *Large Deviations, Escape Dynamics*

QuantEcon Lectures

Not coincidentally, the organization and content of course mirrors the structure of the *QuantEcon* site. Students should work through as many of these lectures as possible. Each lecture opens with a clear and concise summary of the main economic concepts that each program is designed to illustrate. After working through the lectures, not only will your programming skills improve, but you will learn a lot of economics along the way! In fact, you might even want to browse the lectures before you dive into the textbook and journal article material.

Unfortunately, we only have time in class to scratch the surface. The following is a list of (Python) lectures that are most closely related to the material covered in class:

I. Single-Agent LQG Control & Filtering

- *Linear State Space Models*
- *A First Look at the Kalman Filter*
- *Reverse Engineering a la Muth*
- *LQ Control: Foundations*
- *Optimal Savings I: The Permanent Income Model*
- *Optimal Savings II: LQ Techniques*
- *Consumption and Tax Smoothing with Complete and Incomplete Markets*
- *Recursive Models of Dynamic Linear Economies*
- *Growth in Dynamic Linear Economies*
- *Permanent Income Model using the DLE Class*
- *Robustness*

II. Multiple-Agent Models

- *Rational Expectations Equilibrium*
- *Markov Perfect Equilibrium*
- *Robust Markov Perfect Equilibrium*
- *Uncertainty Traps*
- *Stackelberg Plans*
- *Ramsey Plans, Time Inconsistency, Sustainable Plans*
- *Optimal Taxation in an LQ Economy*
- *Optimal Taxation with State-Contingent Debt*
- *Optimal Taxation without State-Contingent Debt*
- *Fluctuating Interest Rates Deliver Fiscal Insurance*
- *Fiscal Risk and Government Debt*