

UPF Summer School. Department of Economics
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Dynamic Micro Models and Policy Evaluation: Theory and
Empirical Applications

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Course Description: In this mini-course we will build upon the tools learned in first year(s) in your Master's or PhD programs to give you a taste of the theory and applications of the dynamic modeling literature using computational methods, and in some cases on the methods themselves, highlighting the use of these models for policy evaluation. Dynamic Modeling and Computational Economics are possibly the fastest growing areas of interest in economics due to its suitability to model and estimate complicated and realistic decision making problems in microeconomics, macroeconomics, and finance. Industrial Organization, Labor Economics, Health Economics, Finance, Macroeconomic Theory, and their empirical applications are all changing as researchers try to go beyond reduced form models, analytically solvable problems, static models, and standard assumptions, and in order to better reflect how agents (or systems) behave intertemporally and/or under uncertainty. This material CANNOT be learned passively. Active thinking, problem solving, and programming are essential. These tools are only learned by use.

The course is devised to emphasize the *3Ms*: Methodology, Modeling and Message. The *Methodology* it is usually model neutral but in economics we normally start from the *model* and then try to find the most appropriate methodology or technique to solve our problem. However, no matter how elegant the model and how sophisticated the techniques if we are not able to correctly transmit the *message* to the audience or the reader most of our efforts get lost. In this course you will be expected to understand the methods and their applications, apply them to modeling, and finally transmit the message.

Topics to be Covered

1. Dynamic Micro Models and Policy Evaluation: An overview

- Structural Models vs. Reduced Form Models. The Lucas Critique and Natural Experiments.
- Ex-ante vs. Ex-post analysis.
- Program Evaluation vs. Program Design

2. Theory and Computation

- Recursive problems as a general framework. Microeconomics, Macroeconomics, and Finance.
- Discrete-Time, Discrete States-Continuous States Decision Processes. Solution methods

3. Empirical Applications

- Social Security: Retirement, Disability
- Unemployment Insurance
- Private Pensions
- Health Investments

4. Tools

- Non-linear Solution Methods. Optimization.
- Integration and Differentiation.
- Function Approximation, Interpolation.

5. Short Topics

- Derivative Pricing using Monte Carlo Methods.
- Estimation vs. Calibration and Simulation.
- Computational Economics and Econometrics.

General References

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