

Structural Estimation

Discrete choice, matching, and dynamic models

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Rome Economics Doctorate (RED)

Format	Contact hours
Three 90-minute sessions per day	18 hours

Course description

This course introduces structural methods for estimating discrete choice, matching, and dynamic economic models. It emphasizes the links between economic theory, identification, estimation, and computation. Applications include consumer demand, trade flows, labor and marriage matching, hedonic models, and dynamic decision-making.

Learning objectives

By the end of the course, students should be able to:

- formulate structural models of individual choice and market equilibrium;
- understand identification through convexity, duality, and model inversion;
- implement core estimators for discrete choice, demand, matching, and dynamic models;
- assess the computational and empirical tradeoffs among alternative methods.

Course program

Day and theme	Sessions
Day 1 <i>Discrete choice and entropy</i>	1. Random utility models and choice probabilities 2. Convex analysis, entropy, and inversion of discrete-choice models 3. Logistic regression, identification, and estimation
Day 2 <i>Gravity, matching, and hedonics</i>	4. The gravity equation as a discrete-choice model 5. Transferable-utility matching: equilibrium, identification, and estimation 6. Hedonic equilibrium models and empirical implementation
Day 3 <i>Dynamic discrete choice</i>	7. Dynamic programming and Markov decision processes 8. Dynamic discrete-choice models and conditional choice probabilities 9. Identification, estimation, and computational methods
Day 4 <i>Demand and matching without transfers</i>	10. Differentiated-product demand and the BLP framework 11. Instruments, inversion, estimation, and computation in demand models 12. Non-transferable-utility matching: equilibrium and estimation

Format and preparation

Lectures combine analytical material with computational illustrations and exercises. The interval between the two course blocks gives students an opportunity to consolidate the first part of the course and work through short exercises before the second block. Familiarity with graduate microeconomics and econometrics is expected. Programming experience is useful but not required.

Principal reference and course materials

The principal reference is Alfred Galichon, *Discrete Choice Models: Mathematical Methods, Econometrics, and Data Science*, Princeton University Press, 2026. Slides, code, notebooks, and computational examples are available in the online companion repository.