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July 2025

TENTATIVE WORK SCHEDULE FOR SHORT COURSE

IDENTIFICATION AND ESTIMATION OF DYNAMIC STRUCTURAL MODELS

Overview: This five-day course explores relationships between economic theory, identification, estimation and econometric practice. It develops structural approaches for analyzing large cross sectional and longitudinal data sets, by exploiting restrictions derived from the equilibrium dynamic outcomes of economic theory. The empirical specifications are derived from the data generating processes of models of individual discrete and continuous optimization, Nash equilibrium in non-cooperative games and market microstructure, optimal contracts, as well as competitive equilibrium. We investigate empirical content, characterize identification, evaluate alternative estimators and testing procedures, as well as consider counterfactuals.

Lectures and exercises: Classes meet for five consecutive days from 10:00AM through 4:00 for 70 minutes, punctuated by 10-minute breaks, with an hour off for lunch. We will both be available for informal discussions between each class, at lunchtime, and after the four classes conclude for the day at 4:00PM. To take this course for a grade and/or receive certification, students will be required to undertake some short assignments each evening after class that develop their proficiency in undertaking structural estimation. Background and approaches to completing the assignments will be discussed at the practicum, and solutions will be provided at the beginning of the next practicum. Solutions submitted by groups of two or three are encouraged. Students should bring their laptops to each practicum.

Prerequisites: To do the assignments, students taking this course for a grade are encouraged to form teams of two or three, either before the course starts or immediately after the first lecture, Students benefiting most from this course will have completed a year of graduate study in an economics program that includes courses, or at least lectures and exercises, in:

- *probability* (distribution functions, probability density functions, transition matrices, Bayes rule, laws of large numbers, central limit theorems).
- *econometrics* (instrumental variables estimation, generalized methods of moments estimators, nonparametric methods, maximum likelihood, hypothesis tests, confidence intervals).
- *optimization* (first and second order conditions, dynamic programming, backwards induction, Euler equations, social surplus functions).
- *equilibrium* (competitive, Nash, Markov perfect).
- *programming* (at least one of Matlab, R, Julia, Python).

Monday July 28, 2025

- 10:00 am – 11:10 am: Continuous choices in competitive equilibrium (lecture)
- 11:10 am – 11:20 am: Short break
- 11:20 am – 12:30 pm: Discrete choices (lecture)
- 12:30 pm – 1:30 pm: Lunch

- 1:30 pm – 2:40 pm: Continuous and discrete choices (lecture)
- 2:40 pm – 2:50 pm: Short break
- 2:50 pm – 4:00 pm: A first exercise in structural estimation (practicum)

Tuesday July 29, 2025

- 10:00 am – 11:10 am: Dynamic discrete choice (lecture)
- 11:10 am – 11:20 am: Short break
- 11:20 am – 12:30 pm: Identification (lecture)
- 12:30 pm – 1:30 pm: Lunch
- 1:30 pm – 2:40 pm: Conditional choice probability estimators (lecture)
- 2:40 pm – 2:50 pm: Short break
- 2:50 pm – 4:00 pm: Estimating with CCP (practicum)

Wednesday July 30, 2025

- 10:00 am – 11:10 am: Lifecycle labor supply, fertility and housing choices (lecture)
- 11:10 am – 11:20 am: Short break
- 11:20 am – 12:30 pm: ML and unobserved heterogeneity (lecture)
- 12:30 pm – 1:30 pm: Lunch
- 1:30 pm – 2:40 pm: A CCP approach to unobserved heterogeneity (lecture)
- 2:40 pm – 2:50 pm: Short break
- 2:50 pm – 4:00 pm: Estimating models with unobserved heterogeneity (practicum)

Thursday July 31, 2025

- 10:00 am – 11:10 am: Dynamic games (lecture)
- 11:10 am – 11:20 am: Short break
- 11:20 am – 12:30 pm: Equilibrium production and entry (lecture)
- 12:30 pm – 1:30 pm: Lunch
- 1:15 pm – 2:30 pm: Unobserved heterogeneity in dynamic games (lecture)
- 2:30 pm – 2:45 pm: Short break
- 2:45 pm – 4:00 pm: Estimating a dynamic game (practicum)

Friday August 1, 2025

- 10:00 am – 11:10 am: Optimal contracting when there is moral hazard (lecture)
- 11:10 am – 11:20 am: Short break
- 11:20 am – 12:30 pm: Hidden information and moral hazard (lecture)
- 12:30 pm – 1:30 pm: Lunch
- 1:30 pm – 2:40 pm: Career concerns (lecture)
- 2:40 pm – 2:50 pm: Short break
- 2:50 pm – 4:00 pm: Estimating models with moral hazard (practicum)