Course:	**ECON 899 - Topics in Computational Economics (second-quarter)**
Schedule:	Sep 8, 2021-Dec 15, 2021, MoWe 5:30PM - 6:45PM
Meeting room:	INGRAHAM 122
Professor:	Jean-François Houde
	Email: houde@wisc.edu
	Webpage: https://jfhoude.econ.wisc.edu
	Office: 7446 Social Science Building
Office hours:	Mondays, 4:00pm to 5pm.
Course Website:	Canvas

Learning outcomes

The goal of this course is help students make the transition from formal Econometrics and Theory training to applications. We will cover methods used to analyze numerically the predictions of micro-economic economic models, and estimate technology and preference parameters (aka "structural" econometrics). The methods are relevant for students interested in conducting research in applied microeconomic fields, as well as for macro-economics students interested in models of strategic interactions and heterogeneous agents. The instructional mode for the course will be face-to-face lectures.

Credit

ECON 999 is a 3 credit course. This syllabus is relevant for second half. The first half is covered by Prof. Dean Corbae.

Grades

The grades for the second-half will be based on five homeworks (75%) and a replication paper (25%)

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List of topics

1. Introduction to discrete-choice models: Train (2009)
2. Simulated-based estimation methods: Train (2009), Keane (1994), McCulloch and Rossi (1994)
3. Non-linear estimators: Allen, Clark, and Houde (2019), Cardon and Hendel (2001), Sauer and Taber (2021)
4. Dynamic discrete choice models:
   (a) Methods: Rust (1987), Aguirregabiria and Mira (2002)
   (b) Curse of dimensionality: Rust (1997), Keane and Wolpin (1994), Keane and Wolpin (1997)
   (c) Unobserved heterogeneity: Ackerberg (2009), Nevo, Turner, and Williams (2016)
5. Demand for differentiated products:
   (a) Model and solution algorithm: Berry, Levinsohn, and Pakes (1995)
   (b) Estimation: Gandhi and Houde (2019)
6. Strategic models of industry dynamics:
   (a) Introduction to strategic models: Seim (2007), Nevo (2000)
   (b) Markov games: Pakes and McGuire (1994), Besanko and Doraszelski (2004)
   (c) Solution methods: Doraszelski and Pakes (2007), Ifrach and Weintraub (2017)
   (d) Oblivious equilibrium: Weintraub, Benkard, and van Roy (2008), Weintraub, Benkard, and van Roy (2010)
7. Estimation of dynamic games
   (a) Methods: Aguirregabiria and Mira (2007), Pesendorfer and Schmidt-Dengler (2007)
   (b) Applications: Collard-Wexler (2013)

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Problem sets

The problem sets will cover the following topics:

1. Simulated maximum-likelihood estimation of a dynamic Probit model
2. Nested-fixed point estimation of dynamic discrete choice model
3. Estimation of demand for differentiated products
4. Dynamic game of capacity accumulation

Your write-ups for the problem sets should consist of two portions:

- Answers to the questions, with whatever text is required to explain them. The idea is to practice writing up empirical analyses as you would for a paper. This document must be typed in Latex
- A well-commented and easy-to-read program file showing how you got the answers to the numerical questions.

Turning stuff in

Please turn all graded work in via canvas.

Statistical software

The course will cover numerical methods used to estimate and solve different types of economic models. You will need to use statistical and optimization softwares to complete problem sets. I recommend using a commercial or open-source software such as Matlab, Python, Julia or Fortran. If you are not familiar with a programming language, I recommend adopting Python or Julia. I personally use Ox; a simple and powerful Object-Oriented matrix language. It is available for free:

- Download link: https://www.doornik.com/products.html#OxCons
- Online documentation: https://www.doornik.com/ox/

The professional version is available on Linstat using the command oxl64. The solutions to the problem-sets will be available in Ox.

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General readings and textbooks

There is no textbook for the course. The following texts are useful references to learn more about numerical methods and structural estimation:

- Computational methods: Miranda and Fackler (2002), Judd (1999)
- Simulation methods: Train (2009)
- Estimation of dynamic models: Adda and Cooper (2003)
- Handbook chapters: Rust (1994), Keane, Todd, and Wolpin (2011)

Academic calendar & religious observances

See: https://secfac.wisc.edu/academic-calendar/#religious-observances

Academic Integrity

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

https://conduct.students.wisc.edu/syllabus-statement/

Accommodations for students with disabilities

McBurney Disability Resource Center recommended syllabus statement: The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. https://mcburney.wisc.edu/instructor/

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Diversity and Inclusion

Institutional statement on diversity: Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background of people who as students, faculty, and staff serve Wisconsin and the world. https://diversity.wisc.edu/

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