ECON7311 MICROECONOMETRICS

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Section 001
Spring 2025

Course Prerequisites

Students must have taken ECON6309 (Econometrics I) and ECON7309 (Econometrics II). Ideally you should have taken ECON6301 (Microeconomics I) as well.

Course Description

The course covers microeconometric topics such as panel data models, limited dependent variable models, treatment effects, difference-in-differences, structural models, simulation methods, and non-/semi-parametrics. Emphasis is placed on both theory and empirical applications.

Student Learning Objectives/Outcomes

After taking the course, students are expected to: (1) conduct literature review to follow and understand the recent advances in econometrics; (2) understand the necessary econometric software/tools to analyze economic data/models; (3) implement various econometric analyses and interpret the results; (4) communicate the results to peers, professionals, and undergraduate students.

Required Textbooks

None.

Highly Recommended Textbooks

(A2021) *Learning Microeconometrics with R*, Adams, CRC, 2021.

(ACQ2016) *Microeconometrics and MATLAB: An Introduction*, Adams, Clarke, and Quinn, Oxford, 2016.

(B2021) *Econometric Analysis of Panel Data* (6th Ed), Baltagi, Wiley, 2021.

(CT2005) *Microeconometrics: Methods and Applications*, Cameron and Trivedi, Cambridge, 2005.

(CT2022) *Microeconometrics Using Stata* (2nd Ed), Cameron and Trivedi, Stata Press, 2022.

(H2022) *Analysis of Panel Data* (4th Ed), Hsiao, Cambridge, 2022.

(W2010) *Econometric Analysis of Cross Section and Panel Data* (2nd Ed), Wooldridge, MIT, 2010.

Recommended Textbooks

(AP2008) *Mostly Harmless Econometrics: An Empiricist's Companion*, Angrist and Pischke, Princeton University Press, 2008.

(AP2014) *Mastering 'Metrics: The Path from Cause to Effect*, Angrist and Pischke, Princeton University Press, 2014.

(F2004) *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*, Frees, Cambridge, 2004.

(G2020) *Financial Microeconometrics : A Research Methodology in Corporate Finance and Accounting*, Adams, Springer, 2020.

(L2002) *Panel Data Econometrics: Methods of Moments and Limited Dependent Variables*, Lee, Academic Press, 2002.

(LR2007) *Nonparametric Econometrics*, Li and Racine, Princeton University Press, 2007.

(M2003) *Panel Data Econometrics*, Arellano, Oxford, 2003.

Optional Textbooks

(G2018) *Econometric Analysis* (8th Ed), Greene, Prentice-Hall, 2018.

(GHJ1993) *Learning and Practicing Econometrics*, Griffiths, Hill and Judge, Wiley, 1993.

(H2012) *Statistics with Stata 12*, Hamilton, Duxbury, 2012.

(JD1997) *Econometric Methods* (4th Ed), Johnston and DiNardo, McGraw-Hill, 1997.

(M2001) *Introduction to Econometrics* (3rd Ed), Maddala, Wiley, 2001.

(W2012) *Introductory Econometrics* (5th Ed), Wooldridge, South-Western, 2012.

Topics and Tentative Academic Calendar

Weeks 1	Syllabus
Weeks 2–4	One-way FE and RE
Weeks 5–6	Hypothesis Testing
Weeks 6–8	Two-way model, Treatment Effects, Difference-in-differences
Week 9	Spring Break
Week 10	Heteroskedasticity and Autocorrelation
Weeks 11–12	Simultaneous Equations
Weeks 13–14	Dynamic Model, Nonlinear Model
Weeks 14–15	Simulation Methods in Limited Dependent Variable Models
Week 16	Nonparametrics

If there is sufficient interest and time, we can cover some structural modelling. This is a very ambitious plan and I do not expect us to cover all the topics.

Exams

There will be one exam. The date of the exam will be announced in class.

Homework and Project

There will be homework assignments, including both theoretical and empirical questions, throughout the semester. The due date of each assignment will be announced in class. *No late assignment will be accepted.* There will also be a project and a presentation in class. The details will be available later in the semester (partly dependent on the enrollment).

Various software (such as STATA, MATLAB, LIMDEP, R, and GAUSS) will be discussed and demo programs will be provided. Students may choose other statistical software.

Grading

Assignments	40%
Project	10%
Presentations	10%
Exam	40%
Total	100%

Grading Scales: ≥ 90 A, ≥ 60 B, < 60 C. The instructor may adjust the grading scales at his sole discretion.

Class Materials

The Instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course. However, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty.

Class Participation

Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. Quizzes will be used to indicate class participation (all students, synchronous or asynchronous, will take the quizzes at your own time). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility

has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Communication

This course utilizes online tools for interaction and communication. Some external communication tools such as regular email and a web conferencing tool may also be used during the semester. For more details, please visit the Student eLearning Tutorials webpage for video demonstrations on eLearning tools.

Students are welcome to discuss homework assignments and other things in Discussion Board in eLearning.

Email is the best way to reach me. Student emails will be answered within 3 business days, if not sooner, under normal circumstances.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

The information contained in the following link lists the University's academic support resources for all students.

Please go to Academic Support Resources webpage for these policies.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

Please go to `https://go.utdallas.edu/syllabus-policies` for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.

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Formula Sheet for ECON7311

This formula sheet will be provided in your midterm and final exams.

1 Matrix Algebra

Trace of a (Square) Matrix: (A and B are square matrices and k is a scalar)

$$\begin{aligned} \text{tr}(A+B) &= \text{tr}A + \text{tr}B. \\ \text{tr}(kA) &= k\,\text{tr}A. \\ \text{tr}A' &= \text{tr}A. \\ \text{tr}(AB) &= \text{tr}(BA). \end{aligned}$$

The Kronecker Product:

$$\begin{aligned} A\otimes B\otimes C &= (A\otimes B)\otimes C = A\otimes(B\otimes C). \\ (A+B)\otimes(C+D) &= A\otimes C + A\otimes D + B\otimes C + B\otimes D \text{ if } A+B \text{ and } C+D \text{ exist.} \\ (A\otimes B)(C\otimes D) &= AC\otimes BD \text{ if } AC \text{ and } BD \text{ exist.} \\ (A\otimes B)' &= A'\otimes B'. \\ (A\otimes B)^{-1} &= A^{-1}\otimes B^{-1} \text{ if } A \text{ and } B \text{ are non-singular.} \end{aligned}$$

Eigenvector and Eigenvalue:

$$\begin{aligned} \text{tr}A &= \lambda_1+\lambda_2+\ldots+\lambda_n. \\ |A| &= \lambda_1\lambda_2\ldots\lambda_n. \end{aligned}$$

Matrix Calculus:

$$\begin{aligned} \partial a'x/\partial x &= a. \\ \frac{\partial x'Bx}{\partial x} &= Bx+B'x \\ &= 2Bx \text{ if } B \text{ is symmetric.} \end{aligned}$$

Properties of P and Q in one-way models:

- $P'=P$ and $P^2=P$. Same goes for Q.
- $PQ=0$.
- $P+Q=I_{NT}$.

2 Regressions

- Consider the regression model $y=X\beta+e$ where $e\sim(0,\Omega)$.
  The OLS estimator is given by $(X'X)^{-1}X'y$.
  The GLS estimator is given by $(X'\Omega^{-1}X)^{-1}X'\Omega^{-1}y$.
  You can use the above two formulas in the exams without proving them.