

ECON 818, Fall 2025

Advanced Econometrics II

Instructor Contact Information

Instructor Name and Preferred Title: Zongwu Cai, Professor

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Office Hours: MW 12:00 pm – 14:00pm, or by appointment

Class Time and Location

Class Time: MW 14:00 pm – 15:15 pm

Class Location: Snow 358

Semester: Fall 2025

Course Hours and Instructional Methods:

This is an in-person course that fulfills 3 credit hours. Consistent with KU policy and the federal definition of a credit hour, this means you should expect to spend at least 9 hours a week on this course over the 15-week semester. Most weeks 2.5 hours will be instructional time in the classroom (i.e., class meetings) and the remaining time will involve out-of-class work. The instructional mode will be lecture only, but often conducted as a seminar with in-class discussion and possible collaboration on research.

Course Description

This is one of the core courses required for the Ph.D. program in economics and it is about the study of estimation and hypothesis testing within the context of the stochastic simultaneous equation models, such as, for linear and nonlinear parametric regression models, which can be applied in microeconomics and macroeconomics research. It emphasizes on theory and methodologies as well as applications. Inference with those models will be by nonlinear parametric, semi-parametric, and nonparametric methods. Prerequisite: [ECON817](#).

Learning Outcomes

After successful completion of this course, you will be able to:

1. Conduct state of the art publishable research on advanced econometrics or using advanced econometric tools to solve some real problems.
2. Participate actively in international conferences using microeconomic theory and macroeconomic theory empirically.
3. Be identified internationally as an authority on advanced econometrics.
4. Contribute to governmental research and policy using advanced econometrics.

5. Carry on your own research in a manner identifying you within the profession as affiliated with others having expertise in your research.
6. It is important to use [R](#) or [Python](#) (coding techniques) for doing real data analysis and conducting Monte Carlo simulation studies. I assume that you already know how to use them since you did in ECON817.

Course Materials

The textbook for this course is “*Econometric Theory and Methods*” by Russel Davidson and James MacKinnon (2004) [Oxford University Press, New York, ISBN 978-0-19-512372-2]. The course includes Chapters 9, 10, 11, and 15 (partial material) from this book and some additional materials, including but not limited to, some materials regarding nonparametric GMM, quasi-likelihood, profile likelihood, random censoring models, duration models, and my own lecture notes on “*Nonparametric Econometrics*”, which can be downloaded from [the course website](#). If needed, some other materials will be provided via e-mail.

Course Assignments and Requirements

Reading assignments for each class will depend upon the speed with which the class progresses through the relevant material as well as the research interests of the class. Problems for Homework will be assigned at class meetings. No late homework will be accepted. Missed homework will receive a grade of zero. The homework will be collected at the end of each chapter (the due date will be announced later) and graded. You are allowed to work with other students on the computer coding for some homework problems, however, verbatim copying of homework is absolutely forbidden. Therefore, each of you must ultimately produce your own homework to be handed in and graded. Homework assignments are long and painful and require a lot of effort on your part, but you will not be able to do well on exams without doing homework assignments.

When you submit your HW, please use your name as the file name, for example, [Cai_HW#1.pdf](#), in the PDF format. If your HW is based on your handwriting, please scan it to be PDF format. For some excises for real data analysis, I only need your results and interpretations. Please do not include the computer codes.

Exams

There is only one exam which will be on [October 15 \(Wednesday, after the fall break\)](#). The exam is closed book. However, you may choose to prepare a formula sheet for reference for the exam. No missed exam can be made up for any reason.

Term Paper

In this class, each student is required to write a short paper involving econometric analysis using econometric tools learned from this class such as nonparametric or semiparametric techniques. For detailed guideline for the term paper, please the requirements at the end of this file (page 6).

General Assignment Information

- Unsolved problems in the relevant literature will be emphasized in class along with the kinds of expertise needed to solve the problems.
- Students interested in contributing to this literature by solving those unsolved problems will be encouraged to do so.
- Students wishing to apply but not extend the methodology covered in the course will be encouraged to do so, if focused on a new application not previously published.
- A term paper is required by either using nonparametric techniques learned from this course to analyze real data (applied problems) or reading papers from originally publishable research.

Evaluation Criteria and Grading Scale

Student Survey of Teaching

You will have multiple opportunities to provide feedback on your experience in this course. Suggestions and constructive criticism are encouraged throughout the course and may be particularly valuable early in the semester. You will also be asked to complete an end-of-semester, online Student Survey of Teaching, which could inform modifications to this course (and other courses that I teach) in the future.

Grading

Students taking the course for a grade are required to complete all the homework assignments, the exam, and the term paper, which will include some applications of the methods that you have learned in the course. The final grade consists of **Exam with 1/3, homework with 1/3, and the term paper with 1/3**.

Grading Scale

89.5% - 100% = A
84.5% - 89.4% = B+
79.5% - 84.4% = B
74.5% - 79.4% = C+
0.00% - 74.4% = C

Incomplete Grades

You may be assigned an 'I' (Incomplete) grade if you are unable to complete some portion of the assigned course work because of an unanticipated illness, accident, work-related responsibility, family hardship, or verified learning disability. An Incomplete grade is not intended to give you additional time to complete course assignments or extra credit unless there is indication that the specified circumstances prevented you from completing course assignments on time.

Attendance Policy

The attendance policy is consistent with the [University Excused Absences](#) policy (USRR 2.2.1).

Academic Success

In addition to any policies and resources noted above, the [KU Academic Success Student Resources](#) website provides links to KU Policies and Resources pertaining to academic misconduct, grading policies, harassment and discrimination, diversity and inclusion, mandatory reporting, equal opportunity and affirmative action, and student rights and responsibilities. Please visit the site to familiarize yourself with these policies and resources. If you have questions or concerns about any of these policies, statements, or resources, please let me know, or contact Student Affairs directly.

Diversify and Inclusion Policy

Here is the [diversity and inclusion policy](#) at KU. As a premier international research university, KU is committed to an open, diverse and inclusive learning and working environment that nurtures the growth and development of all. KU holds steadfast in the belief that an array of values, interests, experiences, and intellectual and cultural viewpoints enrich learning and our workplace. The promotion of and support for a diverse and inclusive community of mutual respect require the engagement of the entire university.

Course Schedule

Week	Date	Topic	Assignment	Due Today
1	August 18, 20	Chapter 9: GMM	Read Chapter 9 of Textbook	
2	August 25, 27	Chapter 9: GMM	Chapter 9 of Textbook	
3	Sept 1, 3	Chapter 9: Nonparametric GMM Methods	Read the handouts	Labor Day on Sept 1
4	Sept 8, 10	Chapter 10: MLE	Read Chapter 10 of Textbook	Due day for HW#1 from Chapter 9
5	Sept 15, 17	Chapter 10: MLE	Read Chapter 10 of Textbook	
6	Sept 22, 24	Chapter 11: Discrete and Limited Dependent Variable	Read Chapter 11 of Textbook	Due day for HW#2 from Chapter 10

Week	Date	Topic	Assignment	Due Today
7	Sept 29, Oct 1	Chapter 11: Discrete and Limited Dependent Variable	Read Chapter 11 and Handouts	
8	Oct 6, 8	Chapter 11: Discrete and Limited Dependent Variable	Read Chapter 11 and Handouts	
9	Oct 13, 15	The first EXAM is on Oct 15 (Wed.)		Fall break is on Oct 13 (Monday)
10	Oct 20, 22	Chapter 1 of Lecture Notes: Density, Distribution & Quantile Estimations	Read Chapter 1 of Lecture Notes	Due day for HW#3 from Chapter 11
11	Oct 27, 29	Chapter 1 of Lecture Notes: Density, Distribution & Quantile Estimations	Read Chapter 1 of Lecture Notes	
12	Nov 3, 5	Chapter 1 of Lecture Notes: Density, Distribution & Quantile Estimations	Read Chapter 1 of Lecture Notes	Due day for HW#4 for Chapter 1 of Lecture Notes
13	Nov 10, 12	Chapter 2 of Lecture Notes: Nonparametric Regression Models	Read Chapter 2 of Lecture Notes	
14	Nov 17, 20	Chapter 2 of Lecture Notes: Nonparametric Regression Models	Read Chapter 2 of Lecture Notes	
15	Nov 24, 26	Chapter 2 of Lecture Notes: Nonparametric Regression Models	Read Chapter 2 of Lecture Notes	Thanksgiving—No class on Wednesday (Nov 26)
16	Dec 1, 4	Chapter 3 of Lecture Notes: Nonparametric Quantile Models	Read Chapter 3 of Lecture Notes	Due day for HW#5 for Chapters 2 and 3 of Lecture Notes
17	Dec 8 -12	Finals Week		Dec. 10 (Wed.) Term Paper is due

Term Paper Guidelines

The term paper provides an opportunity to apply the advanced econometric tools learned in class to a real-world issue chosen by the student. **You need to choose your own topic and gather or find or download your own data. Please come to see me if you need my help to find a topic.** This approach requires a bit more time but also requires you to propose your own model within the confines of the data provided. I recommend that you choose a topic in which you are interested but also one with a narrow focus. A narrow focus increases the probability that the project will both be completed by the semester's end and be of sufficient quality.

I recommend you begin thinking about this project as soon as possible and to avoid putting off writing the paper until the last few days of class. A good strategy is to talk to me about your project early in the semester, to keep in contact with me concerning your data and estimations as well as testing procedures before the final draft is submitted.

The final version of the term paper is due at the end of the semester **(December 10, Wednesday)**.

There are a few guidelines that you must follow:

1. The term paper should be **about 10 double-spaced and single-sided pages**.
2. Papers should be generally structured in the following manner:
 - Introduction of the economic/econometric problem - what are you doing and why do we care?
 - Brief review of previous literature dealing with your problem (include standard academic references)
 - Introduction of your econometric model and data, including specific data source(s)
 - Review and interpretation of your estimation and inference results in your own language
 - Concluding remarks
 - Reference list
 - Econometric results in tabular form
 - Figures if any
3. You must provide an electronic form of your data, programs, program output and the term paper (in a zipped file with your name as the zipped file name). If I do not receive all required files, you might receive a zero score on the term paper.