University of South Florida
College of Arts and Sciences
Department of Economics

ECO 4421 Introduction to Econometrics: Syllabus

CRN 90980, Section 001, 3 Credits

Class meeting time: Mon & Wed 11:00 am – 12:15 pm
Class meeting location: CMC 130
Instructor: Xingxing (Shinshin) Yang
Office Location: CMC 207H
Office Hours: Tue 1:15 – 2:30 pm or by Teams appointment
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I. Welcome!

This is a first course in econometrics – a field that applies statistics and empirical data for economics analyses. The focus of this course is **causal inference**. Although it's generally necessary to conduct experiments for causal inference, doing experiments in economics – which involves human subjects – is limited for various reasons. Thus, econometrics is developed as a set of models and techniques for conducting causal inference with *observational data* (as opposed to experimental data).

Throughout the semester, we'll start with the theoretical framework (including a review of statistics and probability), then we'll work with dataset of various topics, such as education and labor economics, using R – a popular statistical software. This course will likely be very useful for your career, as knowledge of econometrics is necessary for both advanced studies and professional development.

I welcome any questions or concerns about the class throughout the semester. Your questions are important for me to monitor your learning progress and learn about the effectiveness of my teaching; hence they will benefit the whole class. The preferred communication method after class is email. When e-mailing me, please remember to indicate in which class you are enrolled so that I can more effectively answer your questions or concerns. Courteous and professional e-mails are appreciated.

II. University Course Description

An introductory course in econometrics. Topics include review of probability and statistics, classical linear regression models, hypothesis testing regarding model parameters, and model specifications.

Course Prerequisites

ECO 3101 or ECP 3703 with a minimum grade of C-, and STA 2023 with a minimum grade of B

III. Textbooks and Technology

Required Textbook:
Stock Watson, Introduction to Econometrics 4th edition, 2018, ISBN 978-0134461991.

Earlier version of this book (i.e. Stock and Watson 2015) is acceptable. It's expected that you read the corresponding chapter/sections before each session. The reading list is shown in the class schedule table in section VIII.

Pearson MyLab Economics (optional): The textbook has a Pearson Mylab Economics version (ISBN 978-0134543932) and you can get it from the bookstore. This platform is a popular study companion and provides plenty of online practices.

Statistical Software: **R and R studio**

R is the programming language and R studio is an integrated development environment (IDE) for R. Both are free to use. You can follow instructions on this website RStudio Desktop - Posit to download and install them.

Supplementary Readings:

- Florian Heiss, *Using R for Introductory Econometrics*, 2nd edition, 2020
- Joshua D. Angrist and Jörn-Steffen Pischke. *Mostly harmless econometrics: An empiricist's companion*. 2009.

IV. Learning Outcome

- Knowledge of basic statistics, such as the concept of the *estimator* and hypothesis testing.
- Be familiar with the classical linear regression model, such as its basic assumptions, the least square estimators and their properties.
- Understand the difference between causation and statistical correlation.
- Be able to conduct regression analysis in R and interpret the results.
- Ability to conduct a simple empirical research, which includes developing the research question, identifying and gathering the relevant real-world data, data analysis, and hypothesis testing to find answers to your research question.
- Be able to write clearly and efficiently communicate your research results.

V. How to Succeed in this Course

The following skills/endeavors are expected for success in this course:

- **Knowledge of statistics.** A good knowledge of statistics is necessary. We are going to spend the four three weeks reviewing it. But please expect extra effort if it's been over a year since your statistics class.
- **Reading of the textbook**. Please be prepared to spend enough time reading the textbook. (as opposed to lecture slides)
- **Practices.** It's expected that you spend at least two hours every week to do the reading and complete the required homework assignments.
- **Independent research**. Independent research means that you need to define your own question and find answers through rigorous analysis. The essential skill for a successful independent research is **critical thinking,** which includes the ability to synthesize information from a various of resources, critically examine your own thinking process (the assumptions, the reasoning steps, etc.), and draw plausible conclusions from the data.

Lastly, I encourage that you form study groups early in the semester so that you can discuss course contents and homework assignments. Being able to talk about the concepts and models in your own

words is a sign of understanding. Moreover, once having a group, you can prepare for the empirical research project sooner.

VI. Grading Scale

Overall Perc	**Grade**
94 - 100	A
90 – 93.99	A-
87 – 89.99	B+
84 – 86.99	B
80 – 83.99	B-
77 – 79.99	C+
74 – 76.99	C
70 – 73.99	C-
67 – 69.99	D+
64 – 66.99	D
60 – 63.99	D-
0 – 59.99	F

VII. Grade Categories and Weights

Items	Weight
Quizzes	15%
Problem Sets	15%
Midterm Exam	16%
Final Exam	24%
Group Project	30%

Quizzes

There are five or six online quizzes in total. They are consisted of multiple-choice questions and fill-in-the-blank questions. You can attempt each quiz up to **two** times, and keep your best score. Unless otherwise announced, the quizzes are due at 11:59 pm on Friday. Late work is accepted but there will be **10% penalty per day**.

Problem Sets

There are four problem sets in total, which require you to show your work (i.e. any intermediate steps for your results). You will be notified when a problem set is posted on Canvas. For each problem set, you need to submit an **electronic version** of your work on Canvas. You are encouraged to work in groups for the problem sets: each group can have up to **four** members and the solution set should report the full name of all group members at the top. Note that each member of the group still needs to submit an identical copy on Canvas (otherwise one of you may be automatically marked as absent work). Your work will be graded on both completeness and correctness. So please show all necessary steps in your solution. A final number without intermediate steps will not receive grade.

Each problem set will also be due at 11:59 pm on Friday. **For problem sets, late submissions will NOT be accepted.** Exception may be granted in situations like illness or family emergency. Details

are provided below. I will post the solutions on Canvas after the problem set is due. You are expected to review the answer keys carefully and ask questions promptly for clarification.

Exams

There will be one in-class midterm and a final exam. The midterm is scheduled in the fifth week and only cover probability and statistics (chapter 2 and 3 of the textbook). The final exam is cumulative and will be held in at the date and time determined by the university.

Only non-graphing calculators and scrap paper are allowed during exams.

Regarding reschedule and make-up exam: If you have three or more final exams scheduled on the same day, you may request to reschedule the final exam to a mutually agreed time. A make-up exam can be provided **only if** the student notifies the instructor in time and provides valid proofs (such as doctor's notes) by the end of the day in which the exam is scheduled. Make-up exam is scheduled at the convenience of the instructor.

Group project

The group project requires you to define your own research question, identify your data needs, and find answer to your research question with the econometric techniques we covered in this class. As a group, you will be evaluated by **a presentation in the thirteenth week** and **a final term paper (due at midnight on Wednesday, December 3rd 2025).** The presentation will account for 10 percent and the final paper accounts for 20 percent of final grade. You can form a group with up to **four** members for this project. It's recommended that you form groups early into the semester and meet periodically for the project. More details will be provided on Canvas.

Extra Credits

There are three ways to earn extra credits: 1) **End-of-term evaluation: 2.5 bonus points**; 2) **Participation: 2.5 bonus points**. Attending class worths 2 points (I will record class attendance for five randomly selected sessions) and the remaining 0.5 points comes from attending office hour and activities like in-class exercises ; 3) bonus points question at the end of each problem set: roughly ten percent of the problem set grade.

Medical Excuses: To be approved for an assignment extension or makeup exam, you must provide a valid document such as doctor's notes as proofs (Note that the Verification of Care Form from SHS is NOT a valid document for medical excuse).

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course. An "I" grade may be awarded to a student only when a small portion of the student's work is incomplete and the student is otherwise earning a passing grade. The time limit for removing the "I" is the second week of the next semester. "I" grades not removed by the end of the time limit will be changed to "IF" or "IU," whichever is appropriate.

VIII. Course Schedule

Plan for Fall2025**

Week	Date	Lecture plan	Textbook section
week 1	25-Aug	Introduction and syllabus review	Chapter 1, all sections
	27-Aug	Review of probability	Section 2.1-2.2; Appx 2.1*
week 2	1-Sep	Labor Day (no class)	

	3-Sep	Review of probability	Section 2.3-2.4
week 3	8-Sep	Review of probability: Sampling distribution	Section 2.5 - 2.6
	10-Sep	Review of Statistics: Estimation	Section 3.1
week 4	15-Sep	Review of Statistics: Hypothesis testing	Section 3.2; Appx. 3.2*
	17-Sep	Review of Statistics: Hypothesis testing	Section 3.3 - 3.4, 3.6*; Appx , 3.3*
week 5	22-Sep	Review for midterm	
	24-Sep	**Midterm**	
week 6	29-Sep	Simple Linear regression model	Section 4.1; Appx 4.2
	1-Oct	The Least Square assumptions	Section 4.2, 4.4;
week 7	6-Oct	Properties of OLS estimators	Section 4.5; Appx 4.3*
	8-Oct	Measures of Fit	Section 4.3
week 8	13-Oct	Inference in linear regression	Section 5.1- 5.2;
	15-Oct	Heteroscedasticity and homoskedasticity	Section 5.4, 5.6*
week 9	20-Oct	Coding in R for simple regression	
	22-Oct	Illustration of an empirical research	
week 10	27-Oct	Omitted variable bias and Multiple regression	Section 6.1 - 6.3
	29-Oct	Least square assumptions and distribution of OLSE	Section 6.4 - 6.6
week 11	3-Nov	Control variables	Section 6.7 and 6.8
	5-Nov	Hypothesis testing in multiple regression	Section 7.1 - 7.4
week 12	10-Nov	Model specification	Lecture notes
	12-Nov	More on regression specifications	Section 7.5, 7.6
week 13	17-Nov	**Group presentation**	
	19-Nov	**Group presentation**	
week 14	24-Nov	TBD	
	26-Nov	TBD	
week 15	1-Dec	Review	
	3-Dec	TBD	**Term paper due**
week 16	Dec 8	**Final Exam**	

* Recommended but not required reading
** This schedule is subject to change at my discretion

IX. Course Policies: Technology and Media

Canvas: This course will be offered via USF's learning management system (LMS), Canvas. If you need help learning how to perform various tasks related to this course or other courses being offered in Canvas, please view the following videos or consult the Canvas help guides. You may also contact USF's IT department at (813) 974-1222 or help@usf.edu.

Generative AI (GenAI) policy: While **GenAI** tools (such as ChatGPT) can offer inspiration and new possibilities, they should not be seen as substitutes for your own work. In particular, this course assumes that work submitted for a grade by students – homework assignments, quizzes, and exam answer – are generated by the students themselves, working individually or in groups as directed by class assignment instructions. In particular, the following constitute violations of academic honesty:

- A student has another person/entity do the work of any substantive portion of a graded assignment for them, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, and/or using ANY GenAI tools.

If you have questions about what constitutes a violation of this statement, please contact me.

Also, please note that academic integrity policies still apply in terms of digital communication. Informing others about the contents of a test is prohibited by the official regulation, as is receiving unauthorized information about an examination.

Course Hero / Chegg Policy: The USF Policy on Academic Integrity specifies that students should not use websites that enable cheating, such as by uploading or downloading material for this purpose. This does apply specifically to Chegg.com and CourseHero.com – any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

X. Course Policies: Student Expectations

Attendance Policy: Attendance is NOT mandatory. However it goes without saying that attending classes is your responsibility and you should show up regularly to keep up with the progress of the lectures.

Professionalism Policy: It's expected that you should maintain a professional demeanor in the classroom. Per university policy and classroom etiquette; mobile phones, iPods, etc. **must be silenced** during all classroom and lab lectures. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade. In addition, please adhere to the policy of no food, tobacco products, or like items in the classroom. Beverages are allowed but must be bottled/capped.

Title IX Policy: Title IX provides federal protections for discrimination based on sex, which includes discrimination based on pregnancy, sexual harassment, and interpersonal violence. To provide support and equal access, USF has designated all faculty (including TAs, Adjunct, etc.) as Responsible Employees (RE). REs are required to report any disclosures of sexual harassment, sexual violence, relationship violence or stalking. The Title IX Office makes every effort, when safe to do so, to reach out and provide resources and accommodations, and to discuss possible options for resolution. Anyone wishing to make a Title IX report or seeking accommodations may do so online, in person, via phone, or email to the Title IX Office. For information about Title IX or for a full list of resources please visit: https://www.usf.edu/title-ix/gethelp/resources.aspx. If you are unsure what to do,

please contact Victim Advocacy – a confidential resource that can review all your options – at 813-974-5756 or va@admin.usf.edu.

XI. Standard University Policies

Policies about disability access, religious observances, academic grievances, academic integrity and misconduct, academic continuity, food insecurity, and sexual harassment are governed by a central set of policies that apply to all classes at USF. These may be accessed at: https://www.usf.edu/provost/faculty/core-syllabus-policy-statements.aspx

XII. Learning Support and Campus Offices

Academic Success Center: For those of you who need extra help in statistics and/or writing for this course, please check out the resources in Academic Success Center at Academic Success Center | USF. They have tutor hubs for subjects in math and statistics, and writing studios. Please check them out and take advantage of these resources if needed.

Academic Accommodations: Students with disabilities are responsible for registering with Student Accessibility Services (SAS) to receive academic accommodations for assignments and exams. For additional information about academic accommodations and resources, please visit the SAS website for the Tampa campuses**.**

Student Ombuds Office: The Student Ombuds Office is a confidential, impartial, informal, and independent resource for students experiencing challenges related to the university. Ombuds can help you safely explore options, clarify processes, and consider next steps. Learn more or make an appointment at usf.edu/student-ombuds.