



Course Number, Title and Credits

ECNU 309 - Introduction to Econometrics - 3 credits

Course Description

This course provides an introduction to applied techniques for analyzing economic and financial data. Key topics include cross-sectional and time series data, regression analysis, hypothesis testing, and selected applied topics in economics, with a strong emphasis on practical applications.

Prerequisites: ECNU 201, ECNU 202, MATU 203 and MATU 115

Course Learning Outcomes

By the end of this course, students should be able to:

1. Apply basic probability and statistics concepts to analyze economic data.
2. Build and interpret simple and multiple linear regression models.
3. Test hypotheses and construct confidence intervals for regression parameters.
4. Use regression techniques to examine relationships between economic variables.
5. Work with different types of data including cross-sectional, time series, and panel data.

Required Textbooks

Introduction to Econometrics, 3 ed., James H. Stock, Mark W. Watson. Pearson, ISBN:9780133595420

Letter Grade/Percentage Equivalent

Grades are determined on a straight-scale basis using the following scales.

A	94%-100%	A-	90%-93%	B+	87%-89%
B	84%-86%	B-	80%-83%	C+	77%-79%
C	74%-76%	C-	70%-73%	D+	67%-69%
D	64%-66%	D-	60%-63%	F	59% and below

Methods of Evaluation for Determining Grades

Assignment Detail for Course:

Assignments	Possible Points
Quizzes	200
Assignments	400
Exams	400
Total Points Possible in Course	1000

Course Outline (Tentative):

Module	Topics & Assignments
Module 1	<p><u>Foundations of Econometrics and Review of Statistics</u> (Ch. 1–3).</p> <ul style="list-style-type: none"> ● Introduction to causal inference ● Review of probability spaces, random variables, and distributions ● Properties of estimators (unbiasedness, consistency) ● Hypothesis testing (t-tests, p-values) for the population mean ● Confidence intervals <p>Quiz 1</p>
Module 2	<p><u>Linear Regression with One Regressor: Estimation and Inference</u> (Ch. 4–5)</p> <ul style="list-style-type: none"> ● Intuition and derivation of OLS ● Interpretation of coefficients ● Measures of fit (R^2 and SER) ● The Least Squares Assumptions ● The Gauss-Markov Theorem and the BLUE property <p>Quiz 2 Assignment 1</p>

Module 3	<p><u>Multiple Regression: Basics, Inference, and Hypothesis Testing</u> (Ch. 6–7)</p> <ul style="list-style-type: none"> ● Causes and consequences of Omitted Variable Bias (OVB) ● OLS estimation of the multiple regression model; Adjusted R² ● Hypothesis testing for single coefficients ● Joint hypothesis testing (the F-statistic) ● Perfect and imperfect multicollinearity <p>Quiz 3</p>
Module 4	<p><u>Nonlinear Regression Functions</u> (Ch. 8)</p> <ul style="list-style-type: none"> ● Polynomial models ● Logarithmic transformations (Log-Log, Log-Level, Level-Log) ● Models with interaction terms (Continuous-Binary, Binary-Binary) <p>Quiz 4 Assignment 2 Midterm Exam</p>
Module 5	<p><u>Assessing Studies and Regression with Panel Data</u> (Ch. 9–10)</p> <ul style="list-style-type: none"> ● Internal and external validity ● Five major threats to internal validity (e.g., simultaneous causality, measurement error) ● Introduction to Panel Data: Fixed effects, entity and time effects, and "before and after" comparisons <p>Quiz 5 Assignment 3</p>
Module 6	<p><u>Binary Dependent Variables</u> (Ch. 11)</p> <ul style="list-style-type: none"> ● Limitations of the Linear Probability Model (LPM) ● Intuition and estimation of Probit and Logit models ● Maximum Likelihood Estimation (MLE) <p>Quiz 6</p>
Module 7	<p><u>Instrumental Variables (IV) Regression</u> (Ch. 12)</p> <ul style="list-style-type: none"> ● Endogeneity and the IV solution ● Identification ● Two-Stage Least Squares (TSLS) estimation ● Instrument relevance and exogeneity <p>Quiz 7</p>

Module 8	<p><u>Time Series Regression and Forecasting</u> (Ch. 14–15)</p> <ul style="list-style-type: none"> ● Characteristics of time series data ● Stationarity ● Autoregressive (AR) and Autoregressive Distributed Lag (ADL) models ● Lag selection <p>Quiz 8</p>
Module 9	<p><u>Advanced Topics in Time Series and Macro-Econometrics</u> (Ch. 16–17)</p> <ul style="list-style-type: none"> ● Dynamic Causal Effects ● Vector Autoregressions (VARs) ● Cointegration and Non-stationarity in macro data <p>Quiz 9</p>
Module 10	<p><u>Final Assessment and Empirical Project</u></p> <ul style="list-style-type: none"> ● Comprehensive course review ● Best practices in empirical research ● Interpreting complex regression tables <p>Quiz 10 Assignment 4 (Final Project) Final Exam</p>

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Submitting to faculty work completed by the use of any artificial intelligence tool without permission and/or when prohibited by class policy. When faculty require the use of technology, including artificial intelligence, as a part of an assignment for the course, there is no violation. Students are reminded to consult syllabi, assignment sheets/rubrics, program documents and their faculty. Use of artificial intelligence, when permitted, must be correctly cited in the assignment.

The UMass Global online library provides resources to support research, proper citation styles, and the safe and responsible use of generative artificial intelligence or Gen AI.

- The [Academic Integrity and Plagiarism Avoidance](#) page provides guidance to help students better understand academic integrity and includes tips on how to avoid plagiarism.

- The [Citing Sources](#) page offers guidance on how to properly cite using APA, MLA, and Chicago styles.
- The [Artificial Intelligence Resource Guide for Students](#) provides advice for understanding and appropriately using generative artificial intelligence tools such as ChatGPT and Bard.

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The CARES team is a campus-wide team of appointed staff and faculty responsible for identifying, assessing, and responding to concerns and/or disruptive behaviors by students, faculty/staff, and community members who struggle academically, emotionally, or psychologically, or who present a risk to the health or safety of the university or its members.

Individuals may refer themselves or other community members of concern by emailing cares@umassglobal.edu or by filling out a referral form [here](#). The CARES Team provides short term assessment, intervention, support, and recommendations of resources to those referred and engaged in the process.

UMass Global's Title IX Statement

The University of Massachusetts Global strives to maintain and foster a climate that promotes respect and human dignity. Sexual misconduct and relationship violence in any form is antithetical to the university's mission and core values, violates university policies, and may also violate federal and state law. The office of Title IX is primarily concerned for students' safety and well-being and is tasked with

investigating all reports of sexual misconduct experienced by our community members. Title IX prohibits sex-based and gender-based discrimination and harassment, which includes discrimination based on pregnancy and/or pregnancy-related complications, parental status, and marital status. Students expecting or experiencing pregnancy-related complications, that may require educational accommodations, should contact the University's Title IX Coordinator and/or the Office of Accessible Education.

The University and Title IX's prohibition of sex discrimination also covers sexual harassment, sexual violence, and any other form of sexual misconduct. We offer options and resources to all students affected by these issues and are committed to providing a fair, thorough, and prompt investigation and adjudication process. If you or someone you know has been impacted by sexual assault, dating, and domestic violence, stalking, or sexual exploitation, please visit the [University's Title IX Resource Page](#) to access additional resources and information.

UMass Global's staff and faculty are tasked with reporting any possible sex or gender-based discrimination or Title IX violations to the University's Title IX Coordinator at civilrightscomplaints@umassglobal.edu.

[Click on this Link to our University Title IX Policy](#)