EC/IB/ST 350 ECONOMETRICS FOR BUSINESS
IES Abroad Madrid

DESCRIPTION:
Econometrics is the application of statistics and mathematics to economic and financial data. In today's world data are largely available and econometric techniques are crucially important to conducting reliable data analyses in private and public institutions. This course introduces students to regression methods for analyzing data in business and economics. After presenting the basic theoretical features of each method, it will familiarize students with how to practically implement estimation and hypothesis testing techniques in various empirical contexts. The main goal of the course is to provide students with a solid theoretical background in introductory level econometrics, to stimulate their abilities to apply such techniques on diverse datasets, and to enable them to critically analyze empirical studies in economics, business, and finance.

CREDITS: 3 credits

CONTACT HOURS: 45 hours

LANGUAGE OF INSTRUCTION: English

PREREQUISITES: One undergraduate-level course in Statistics, Microeconomics, or Macroeconomics

ADDITIONAL COST: None

METHOD OF PRESENTATION:
- Lectures, seminars to discuss assignments, data analysis sessions.
- Slides for each lecture will be made available to students before each lecture. References to the textbook will be provided as well in order to facilitate and clarify the content of the slides.

REQUIRED WORK AND FORM OF ASSESSMENT:
- Course Participation - 10%
- Assignments - 20%
- Midterm - 25%
- Final Exam - 30%
- Final Project - 15%

Course Participation
In addition to actively participating in class, students are required to perform weekly readings and complete practical problem sets. Some of these practice problems will be based on students' datasets and will be carried out using the popular and freely available statistical software Gretl. Students will be expected to complete and submit these exercises. The solutions to these assignments will be discussed during class and are meant to enable students to gain some self-awareness on their level of understanding of the topic and to practice new concepts as they are introduced.

Assignments
Students will be given weekly problem sets composed of practice questions addressing the material covered in the classes before each assignment is due. When appropriate, some of the questions may involve the use of statistical software. Students may work in groups, but each must submit his or her solutions individually. Two of the weekly assignments (in Week 4 and Week 8) will be given a letter grade and each will count for 10% of the final grade. These graded problem sets are intended to give students concrete feedback on their work. The solutions to the problems will be discussed extensively in class.

Midterm
The midterm will be a take-home exam and will take place at the beginning of Week 7. This will consist of a series of practical questions on the material covered from Week 1 to Week 6. When appropriate, some of the questions may involve the use of

statistical software. Students will have three days to complete the take-home exam. Students can expect five questions, each containing several sub-points. Students may work in groups, but each student must submit his or her solutions individually.

Final Exam
The final exam will be held in-class and will be composed of practical questions on all the material covered in the course. Questions in the final exam will not involve the use of a statistical software. Students will be allowed to use a formulae sheet and statistical tables.

Final Project
Students will be asked to conduct a comprehensive analysis of an empirical dataset that requires them to evaluate data, perform advanced calculations, and make recommendations with regard to the data. Student will work in groups on this project over the course of the semester and will be asked to discuss their progress periodically in class. Each group will be assigned a different dataset, which will be assigned based on students' interests and backgrounds. They will be asked to explain and support their results. Results will be presented as a group during the last class of the semester. This project will constitute 10% of the final grade.

LEARNING OUTCOMES:
By the end of the course, students will be able to:

- Know the fundamental econometric models for cross-sections, time series and panel data, their statistical properties, and how to apply them to real data.
- Estimate and critically interpret parameter estimates in simple empirical settings.
- Conduct a comprehensive analysis of an empirical dataset and explain and support their results.
- Evaluate a dataset to extract policy and/or business recommendations.

ATTENDANCE POLICY:
Attendance is mandatory for all IES Abroad classes, including course-related excursions. Any exams, tests, presentations, or other work missed due to student absences can only be rescheduled in cases of documented medical or family emergencies. If a student misses more than two classes in any course half a letter grade will be deducted from the final grade for every additional absence. Seven absences in any course will result in a failing grade.

CONTENT:

Session	Content	Assignments
Week 1 **Session 1**	**Statistical Review** • Probability distributions, expected value, estimator of the sample mean and its sampling distribution, hypothesis testing.	• Textbook: Appendix B (pages 714-744).
Session 2	**Simple linear regression model** • Model assumptions. • Ordinary least squares (OLS) and its statistical properties.	• Textbook: Chapter 2 (pages 22-59)
Week 2 **Session 3**	**Multiple regression model** • Model assumptions, interpretation of estimates, multicollinearity, t-test and F-test.	• Textbook: Chapters 3 and 4, Sections 3.1, 3.2 (pages 68-83), 3.5 (pages 102-104), 4.1, 4.2 (pages 117-138), 4.4, 4.5 (140-154)

Session	Content	Assignments
Session 4	**Dummy variables.** **Discussion of practical questions on Topics 2 and 3** • Definition of dummy variables and interpretation of coefficients. • Selection of relevant questions on Topics 2 and 3.	• Textbook: Chapter 7, Sections 7.1, 7.2, 7.3 (pages 225-238). • Assignment 1
Week 3 **Session 5**	**Heteroskedasticity** • Consequence of heteroscedasticity, robust standard errors, weighted least squares.	• Textbook: Chapters 8, Sections 8.1, 8.2, 8.3,8.4 (pages 264-290)
Session 6	**Model misspecification** • Omitted variable bias, inclusion of irrelevant variables, proxy variables	• Textbook: Chapters 3 and 6, Sections 3.3, 3.4 (pages 84-102), 6.3 (199-206)
Week 4 **Session 7**	**Discussion of practical questions on Topics 5 and 6** • Selection of relevant questions on Topics 5 and 6. By week 4 students should have started to design their survey and their preliminary work will be discussed during this session.	• Assignment 2 (graded)
Session 8	**Endogeneity and instrumental variables** • Random regressors, definition of endogeneity, instrumental variable estimator (IV), two stages least squares	• Textbook: Chapter 15, Sections 15.1, 15.2, 15.3 (506-525) and Appendix C.3 (pages 755-760).
Week 5 **Session 9**	**Endogeneity and instrumental variables** • Measurement error, omitted variables and their IV solution. Testing for endogeneity.	• Textbook: Chapter 15, Sections 15.4, 15.5, 15.6 (pages 525- 531)
Session 10	**Simultaneous equations** • Identification problem, IV solution to simultaneity.	• Textbook: Chapter 16, Sections 16.1, 16.2, 16.3, 16.4 (pages 546-560)

Session	Content	Assignments
Week 6 **Session 11**	**Discussion of practical questions on Topics 8, 9 and 10.** • Selection of relevant questions on Topics 8, 9 and 10. Discussion on how to carry out an empirical analysis starting from a real-life dataset.	• Assignment 3
Session 12	**Linear probability model.** • Model specification, interpretation of coefficients and limitation of this approach.	• Textbook: Chapter 7, Sections 7.5,7.6 (246-254)
Week 7 **Session 13**	**Midterm take-home exam to be held at the beginning of Week 7** **Review of models for cross sectional data** • Review of key concepts covered in Weeks 1-6 by means of comprehensive examples.	
Session 14	**Time series models** • Model assumptions, static models, distributed lag models	• Textbook: Chapters 10 and 11, Sections 10.1, 10.2, 10.3 (340-352), 11.1, 11.2 (377-388), 11.5 (399)
Week 8 **Session 15**	**Serial correlation** • Definition of serial correlation, consequences, robust standard errors, testing for serial correlation.	• Textbook: Chapter 12 (408-436)
Session 16	**Discussion of practical questions on Topics 12, 13 and 14.** • Selection of relevant questions on Topics 12, 13 and 14.	• Assignment 4 (graded)
Week 9 **Session 17**	**Panel data analysis** • Definition of panel dataset, pooled OLS, analysis via differencing	• Textbook: Chapter 13 (444-470)
Session 18	**Panel data analysis** • Fixed effects and random effects models	• Textbook: Chapter 14, Section 14.1, 14.2 (481-493)

Session	Content	Assignments
Week 10 **Session 19**	**Discussion of practical questions on Topics 17 and 18** • Selection of relevant questions on Topics 17 and 18.	• Assignment 5
Session 20	**Review of models for time series and panel data** • Review of key concepts covered in Weeks 7-10 by means of comprehensive examples.	
Week 11 **Session 21**	**Empirical project** • We will review the main topics on cross-sectional data in view of the empirical analysis students have to carry out independently.	
Session 22	**Empirical project** • Each group will present the results of their analysis to the rest of the class.	• Empirical project to be presented and handed in by each group (graded).
	FINAL EXAM	

REQUIRED READINGS:

- Wooldridge, J., *Introductory Econometrics – A Modern Approach*, South-Western Cengage Learning, 4e International Edition, 2008.

RECOMMENDED READINGS:

- Additional readings will be provided, if necessary, on a case-by-case base.