



DEPARTEMENT OF ECONOMICS
Undergraduate Program

Syllabus
ECEU600301
Introduction to Econometrics
3 Credit Semester

	Classes	Tutor
	Prita Nurmalia Kusumawardhani	Chairul Mubin

Subject Code	ECEU600301
Subject Title	Introduction to Econometrics
Credit	3 Credit Semester
Year/Semester	2022-2023/Odd semester
Day/Hour	Thursday, 11:00 – 13:30
Subject Type	<u>Compulsory (Study Program)</u>
Pre-requisite/ Co-requisite/ Exclusion	Mathematics for Economics and Business (ECON 11000) Statistics 1 (ECON 11200)
Role and Purposes	<p>This course aims to provide students with statistical and econometric tools to understand and use those techniques to explain economic variables' relationships. Teaching is carried out with a theoretical and an empirical approach using applicative examples and statistical and econometric software. The topics covered include an overview of the use of econometrics, i.e., the Ordinary Least Square (OLS) model; the basics of simulation; and simultaneous equations. This course focuses on OLS estimation, which includes assumptions that must be met in the OLS approach, consequences for OLS estimation if these assumptions are not met, how to detect violations of OLS assumptions, and solutions if these assumptions are violated. Students will also be taught the basics of simulation, so they can combine concepts usually considered abstract with computer exercises. This course uses traditional lecturing methods and student-centered learning through practicum (lab).</p> <p>After attending this course, students are expected to: 1. Know when the use of econometrics is needed in academic research; 2. Use suitable econometric methods in economic research. 3. Be able to comprehend empirical economic articles.</p>

Subject Learning Outcomes	Objectives Subjects : 1. Hard Skills (related to increased cognitive ability) 2. Soft Skills (related to personality development) 3. AACSB Learning Goal (LG) and Learning Objective (LO) 1. Learning Goal:
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	<p>QUANTITATIVE ANALYTICAL SKILL: Students are competent in quantitative methods for analyzing economic issues</p> <p>2. Learning Objective: Students can apply advanced quantitative methods by using appropriate tools</p> <p>3. Traits: 3.1. Able to conduct relevant data analysis for solving a specified economic research problem</p>			
Subject Synopsis/ Indicative Syllabus				
	Week	Topics & Subtopics	Lecture Resource	Methods
	1	<p>Basic Concept of Econometrics</p> <ul style="list-style-type: none"> Types of equations: (1) identity vs. causality (2), deterministic vs. stochastic Econometric approach: stochastic causality Data structure: Cross Section, Time Series, Pooled Cross Section, Panel/Longitudinal Terms that are often used in economics. Independent variable vs. dependent variable, control variable vs. response variable, regressor vs. regression, etc. Examples of econometric applications 	<p>ALZ: Ch 1</p> <p>DG: Introduction – Ch 1</p> <p>JJ: Ch 1</p> <p>PK: Ch 1</p> <p>JW: Ch 1</p>	<p>Lecturing</p> <p>Active Learning and problem solving</p>

	2	Ordinary Least Square: Simple Regression Model <ul style="list-style-type: none"> • Example case estimation with OLS • OLS parameter derivation process • Review looking for point X that minimizes $Y=f(X)$ • Find the beta parameter that minimizes the error squared=$f(\text{beta})$ • OLS assumptions that must be met, along with graphic illustrations and economic intuition • BLUE concept in graphic and narrative approach. • Hypothesis testing in regression. • The difference between linear in function versus linear in parameter. • The concept of R-squared. • Marginal effect of various functions: linear, semi-log, double log, reciprocal. • Meaning of probability value $> t$ 	ALZ: Ch 9,10 DG: Ch 2-3 PK: Ch 3 JW: Ch 2	Active Learning and problem solving
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	3	Ordinary Least Square: Regression with Simulated Data <ul style="list-style-type: none"> • Constructing covariates, which are fixed in repeated sampling. • Constructing normally distributed errors with an expected value of zero. • Constructing Y using simulation process. • Doing the regression of Y on X and showing that the estimated parameters from the regression are, on average, equal to the set parameters from the simulation. • Show that the resulting parameters from regression have BLUE properties. • Manipulating the value of R-squares from simulation by altering error variances. 	DG: Ch 3.8 PK: Ch 2 LAB 1: Session 2's topic	Active Learning and problem solving
	4	Ordinary Least Square: Multiple Linear Regression <ul style="list-style-type: none"> • Ceteris paribus assumption in multiple linear regression. • The proof of the ceteris paribus assumption is still valid even though we do not find observations where X1 changes by one unit and X2 is constant • Marginal effect interpretation in the regression involving quadratic variables. • Hypothesis testing in multiple linear regression • R-squared is non-decreasing. • The concept of adjusted R-square • The proof that adjusted R-square can be negative 	ALZ: Ch 11 DG: Ch 7-8 JW: Ch 3-6 LAB 2: Session 3's topic.	Active Learning and problem solving

	5	Application and Optional Topic (1): Regression with Qualitative Independent Variables <ul style="list-style-type: none"> • The difference between quantitative versus qualitative variables • The example of regression with qualitative independent variables. • General rules of constructing qualitative variables. • Interactions between independent variables • The application of dummy variable: Difference in difference analysis 	ALZ: Ch 12 DG: Ch 8 PK: Ch 14 JW: Ch 7 LAB 3: Session 4's topic	Active Learning and problem solving
	6	Application and Optional Topics (2): Multiple Linear Regression <ul style="list-style-type: none"> • The role of intercept • Regression without intercept: potential problems • The effect of variables' re-scaling. • Residual analysis 	DG: Ch 6 JW: Ch 2, Ch 6	Active Learning and problem solving
	7	REVIEW	LAB 4: Topic Session 5&6 topics	Active Learning and problem solving
	MIDTERM EXAM			

	8	Violation of OLS Assumption 1: Serial Correlation <ul style="list-style-type: none"> • Definitions and case examples of serial correlation • Consequences for the BLUE properties when using OLS • Detection method • Solution • Regression with simulated data that contains serial correlations. 	ALZ: Ch 14 DG: Ch 12 JJ: Ch 6 PK: Ch 8 JW: Ch 12	Active Learning and problem solving
	9	Violation of OLS Assumption 2: Heteroscedasticity <ul style="list-style-type: none"> • Definition and case examples of heteroscedasticity • Consequences for the BLUE properties when using OLS • Detection method • Solution • Exercises to make a regression containing heteroscedasticity with a simulation approach 	ALZ: Ch 14 DG: Ch 11 JJ: Ch 6 PK: Ch 8 JW: Ch 8 LAB 5: Topics from session 8	Active Learning and problem solving

	10	<p>Violation of OLS Assumption 3: Multicollinearity</p> <ul style="list-style-type: none"> • Definitions and case examples of multicollinearity • Consequences for the BLUE properties when using OLS • Detection method • Solution • Exercises to make a regression containing multicollinearity with a simulation approach <p>Violation of OLS Assumption 4: Correlation between X and error term</p> <ul style="list-style-type: none"> • Detection and case examples • Consequences for the BLUE properties when using OLS. • Detection method • Solution: Indirect Least Square and Two-stage Least Square/Instrumental Variable 	<p>ALZ: Ch 13</p> <p>DG: Ch 10</p> <p>PK: Ch 11</p> <p>LAB 6: Topics from session 9.</p> <p>ALZ: Ch 15</p> <p>DG: Ch 18-20</p> <p>PK: Ch 10</p> <p>JW: Ch 15,16</p>	Active Learning and problem solving
	11	<p>Simultaneous Equation Model</p> <ul style="list-style-type: none"> • Identification problem: under, exact, and over-identification. • Identification rule: order, rank. • Testing • Solution: Indirect least square, two-stage least square 	DG: Ch 18-20	Active Learning and problem solving

	12	Simultaneous Equation Model: Estimation <ul style="list-style-type: none"> • Estimation • Indirect Least Square Method • Two-stage least square (2SLS) • Introduction to Seemingly Unrelated Regression (SUR) 	DG: Ch 18-20	Active Learning and problem solving
	13	Specification Test <ul style="list-style-type: none"> • Basic concepts of specification test • Omitted Variable test • Redundant Variables • Nested Model: Ramsey RESET Test • Non-Nested Model: Davidson-MacKinnon Test, Mizon-Richard Test 	DG: Ch 13 JJ: Ch 4 PK: Ch 5 JW: Ch 3, 9 LAB 7: Topics from Sessions 10, 11, and 12	Active Learning and problem solving
	14	Problem in Data <ul style="list-style-type: none"> • The influence of measurement errors on BLUE properties: (1) Measurement errors on dependent variables (2) Measurement errors on independent variables. • Solution • REVIEW 	PK: Ch 9, 19 JW: Ch 9 LAB 8: Topics from Session 13	Active Learning and problem solving
	FINAL EXAM			

Teaching/Learning Methodology	<p>The teaching method uses active lecturing and class discussions, in which students achieve the study objectives by discussing and completing related problems or cases under the guidance of the lecturer and tutor. The problems and cases are taken from the textbook and other sources.</p> <p>Participation: Individually, each student is required to participate actively in teaching and learning in the form:</p> <ol style="list-style-type: none"> 1. Participate by asking a question and providing an answer <p>Discuss with a classmate To be eligible, students must read textbooks and other materials provided.</p> <p>Attendance: Minimum 80% of Total Lecture:</p> <ol style="list-style-type: none"> 1. A maximum of 3 (three) times absent, for no reason. 2. Students who come 15 minutes after class begins are considered not present. 										
Assessment Method in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="496 860 1069 1659"> <thead> <tr> <th>Assessment method</th><th>Weight (%)</th></tr> </thead> <tbody> <tr> <td>1. Midterm test</td><td>35</td></tr> <tr> <td>2. Finalterm test</td><td>35</td></tr> <tr> <td>3. Assignments and Quizzes Assignments at least consist of: <ul style="list-style-type: none"> - Simple linear regression - Multiple linear regression - Violations of OLS assumptions - Specification tests At least two quizzes (1 time before and 1 time after the mid-term test)</td><td>10</td></tr> <tr> <td>4. Lab assignment with the tutor</td><td>20</td></tr> </tbody> </table>	Assessment method	Weight (%)	1. Midterm test	35	2. Finalterm test	35	3. Assignments and Quizzes Assignments at least consist of: <ul style="list-style-type: none"> - Simple linear regression - Multiple linear regression - Violations of OLS assumptions - Specification tests At least two quizzes (1 time before and 1 time after the mid-term test)	10	4. Lab assignment with the tutor	20
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Schedule of Tutorials	Tutorials (Computer lab) will be held eight times. In the computer lab, students will be trained to replicate the empirical articles or do the exercises in the book with the tutor's assistance.										

Reading List and References	<p>Students can freely choose their readings. Please consider that each book has its unique approach as well as its advantages and disadvantages. Several choices of books that are suggested to provide a solid basic understanding for students include:</p> <p>Main Readings</p> <p>Wooldridge, Jeffrey M (2019), <i>Introductory Econometrics: A Modern Approach</i>. 7th Edition South-Western College Pub. (JW)</p> <p>Gujarati, Damodar (2011). <i>Basic Econometrics</i>. 6th Edition. New York. McGraw-Hill Book Co. (DG)</p> <p>Alternative Readings</p> <p>Ashenfelter, Orley, P B Levine, and David J Zimmerman (2003): <i>Statistics and Econometrics: Method</i>. John Wiley & Sons Inc. (ALZ)</p> <p>Johnston, Jack and John Dinardo (1997), <i>Econometrics Methods</i>. New York. McGraw- Hill Book Co. (JJ)</p> <p>Kennedy, Peter (2008), <i>A Guide to Econometrics</i>. 6th Edition. Wiley-Blackwell. (PK)</p>
Plagiarism	<p>Students should maintain originality and respect intellectual property rights. Therefore, students should avoid committing plagiarism when doing written assignments (if any), which may take the form of short individual/group papers and/or summaries.</p> <p>The followings are acts of plagiarism:</p> <ul style="list-style-type: none"> ● Copying paragraphs, sentences, a single sentence, or even a significant part of a sentence directly without enclosing them in quotation marks and appropriately footnoted; ● Using and/or developing other's ideas found in printed materials or film elsewhere without explicitly referencing them to the respective author or the source of the idea. <p>Plagiarism is a serious infringement of intellectual property rights. Any assignment that contains presumed plagiarism will be marked 0 (zero).</p> <p>In case there is a task to write a paper, students should sign a Statement of Authorship and attach it to the papers before submission. The form of the Statement of Authorship is available at the Resource Center of the Program. Lecturer(s) and/or tutor(s) will refuse to mark any paper that has no signed Statement of Authorship attached.</p> <p>In addition, students should ask for a cover sheet from the Resource Center of the Program for any assignment submitted.</p> <p>Penalty for plagiarism :</p> <ul style="list-style-type: none"> ▪ First time: the paper will be graded zero, or F at the maximum. ▪ Second time: final grade for the specific course will be graded F ▪ Third time: expelled from FEB UI
Statement of Authorship	<p>Statement of Authorship</p> <p>I/we, the undersigned, declare that the attached paper/assignment is purely my/our own work. No other people's work I/we use without citing the source.</p>

	<p>This material is not/has never been presented/used as material for a paper/assignment in any other subject unless I/we state clearly that I/we state clearly that I/we state to use it.</p> <p>I/we understand that this assignment that I/we collect may be reproduced and/or communicated for the purpose of detecting plagiarism.</p> <p>Name : _____</p> <p>NPM : _____</p> <p>Signature : _____</p> <p>Subjects : _____</p> <p>Title of paper/assignment : _____</p> <p>Date : _____</p> <p>Lecturer : _____</p> <p>(made by each student)</p>
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