Lincoln University

BA 466 – Econometrics

COURSE SYLLABUS
2018

Instructor: Prof. Aharon Hibshoosh, Ph.D.

Lecture Schedule: Tuesday, Thursday (8 /21-10/16), 18:30-21:15
Credits: 4 units: 3 units / 45 lecture hours + 1 unit individual research
Level: project
Mastery 2 / Research (M2R)
Office Hours: Tuesday, Thursday: 21:15-23:15

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Textbooks: Damodar J. Guarajti and Dawn C. Porter. (2009). Essentials of Econometrics. Irwin/McGraw Hill, fourth edition, **ISBN-10:** 0073375845, **ISBN-13:** 9780073375847
Robert S. Pindyck and Daniel L. Rubinfeld. (2000). Econometric Models & Economic Forecasts, 4th edition. New York, NY. *McGraw Hill*, ISBN-10: 0071188312, ISBN-13: 978-0071188319.
Other recommended textbooks:
Recommended: William H. Greene "Econometric Analysis", 7th edition, Prentice Hall, 2011.

Jack Johnston and John Di Nardo "Econometric Methods", 4th edition, Irwin/ McGraw Hill 1997

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COURSE DESCRIPTION

The course introduces students to a comprehensive treatment of econometric methods for linear

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models. Among topics covered are: the linear regression, linear simultaneous equations systems, maximum likelihood and instrumental variables estimation strategies, hypothesis testing. Different data and variables presentations and features are discussed. A one-unit written research project and its oral presentation are required for the course. (4 units)
Prerequisite: BA 241 or BA 360

EDUCATIONAL OBJECTIVES

This is an advanced course and a special opportunity. It is essential for a student who takes on a quantitative dissertation in Finance or any other field, and for any student who wants to gain

required skills in data science. It is particularly intended for top students with very good mathematical / statistical skills who are ready to work very hard to gain advanced knowledge in Mathematics, Statistics, and Economics. It is a very brief and intense course with very well defined goals. Simply stated, for conducting any empirical practical study in any field of Economics and Business, basic understanding of Econometrics is a must at school and in the work place. The course is likely to save time for students interested in an empirical DBA projects and thesis.

Econometrics is a specialized area of statistics which deals with the measurement of economics and business data. It is broadly applied in business and industry. It requires the application of economics and business theories and use of dedicated statistical software. This application can easily be learned with the aid of personal computers. The study of econometrics addresses the unique features of stochastic behavior which characterize Business and Economics. For example, imbalanced Panel Data is often encountered in business. I.e. multivariate data is observed for firms over the same time horizon, and the stochastic behavior may be associated with the period and firm. Econometrics involves the study of multiple linear regression and time series analysis and forecasting. Its methods are tailored to deal with the departure of the economic and business behavior from the standard models of regression analysis. Economics, Finance, Marketing and other areas of business provide the theoretical underpinning which logically link variety of variables. To some extent Business and Economics also identify convenient functional forms for linking those variables, where the identified parameters have economics, finance, and marketing interpretations. However, often, the measurement involves variables with errors, and typically we encounter missing variables.
Typically economics data exhibits heteroscedasticity (i.e. error terms are not uniform on often depends on the size of the independent variables). Furthermore, economic relationships often exhibit serial correlation, which depends on time and location. E.g., errors in a focal dependent variable in one period are related to errors in preceding periods**.** These features affect estimation efficiency and forecasts accuracy.
Similarly, misspecification of economic relationships is quite common as is measurement of independent variables with error. The problem is particularly important when we estimate parameters of a system of economic relationships. These features affect both parameter estimation and identification.
Finally, of great important in economic and finance is the time series analysis where we try to estimate and forecast in the context of dynamic relationship. Here special tools have been developed for identification and forecast of time series. Due to the great diversity in student statistical and mathematical programs in class we will be using several text books in teaching econometrics from the elementary and modern textbook of Guarajti and Porter to the classic Johnston and Di Nardo. Typically, the veteran books have more fundamental exposition and would suit the interest of the advanced students in class. I hope to provide individual guidance in your reading. Pindike and Rubinfeld text would provide the basic skeleton for the exposed topics.

COURSE LEARNING OUTCOMES[1]

As a result of your study you should be able to:

	Course LO	Program LO	Institutional LO	Assessment Activities
1	Demonstrate ability of modeling business and economics relationships based on economics and business theories.	PLO 1 PLO 2	ILO 1C, ILO 3C, ILO 7C ILO 3C, ILO 4C, ILO 6, ILO 7C.	Homework, case analysis
2	Understand the assumptions of the classical Linear Multiple Regression model, and the departure in econometrics from these assumptions.			Homework, case analysis
3	Gain familiarity with transformation of economics models.			Homework, case analysis
4	Demonstrate ability to estimate parameters of the Linear multiple Regression model, how to test hypotheses regarding the parameters values, and how to forecast based on linear regressions models.			Homework, case analysis
5	Gain experience in computer processing of econometric data.			Homework, case analysis
6	Demonstrate ability to estimate the biased effects of errors in variables on the estimated variable and how to use instrumental variables to eliminate or minimize the bias.			Homework, case analysis
7	Demonstrate ability to test for serial correlation, estimate it and how to take advantage of the estimate in generating forecasts; and gain basic familiarity with Box-Jenkins ARIMA model.			Homework, case analysis
8	Demonstrate ability to deal with multicolinearity.			Homework, case analysis
9	Demonstrate ability to deal with identification and estimation problems of simultaneous economicrelationships.			Homework, case analysis
10	Learn to appropriately choose and process cross sectional time series models.			Homework, case analysis
11	Conduct a business study (project) using econometrics methods.			Homework, case analysis

[1] Detailed description of learning outcomes and information about the assessment procedure are available at the Center for Teaching and Learning website (ctl.lincolnuca.edu).

METHODOLOGY

Both scalar and Matrix exposition would be taught and used. The course is based on lecture and homework. The homework would be both theoretical and empirical using employing statistical software and actual data. In every homework and assignment, a communication presenting short description of the nature of the assignment and its lessons must be presented as an essential part of the submitted HW, or any other assignment. An econometric project would be assigned. For this purpose, student research topics in other courses or dissertations may be proposed by the students and are welcome. Both individual and group homework may be assigned. The range of this homework and project would depend on the range of available statistical software. I would like to emphasize the importance of the quality of the research project and its presentation by the student. This research project must be of high quality. It would be presented to both class and faculty. (At least one more faculty member would attend the presentation.). The project is the reason for adding a fourth unit to the course credit. Students are thus expected to dedicated considerable time to the project.

As software we will use Gretl. (We will follow the download and use in class.). This econometric software is freely available and is suitable for this course. However, there are costly other programs which are available for students and industry for a fee. I would be glad to guide any individual student who has access to any of this program in its use.

We are using the CANVAS software for HW collection, submission time monitoring and grade assignments. The HW files are submitted for gading *only* through CANVAS. However, hard copy of the submitted HW must also be brought to class, submitted for brief inspection and used in class. Every student must be listed with CANVAS. An adding student must belong to a group and inform the teaching assistant his/her adding status and group number. HW is due by 1AM Tuesday or Thursday as instructed by CANVAS. If you are late, you still may use an automatic extension of 8 hours and submit the HW by 9 AM Tuesday or Thursday through CANVAS. CANVAS has a built in time cut off function and would not allow submission past the deadline or the deadline extension. No further extension would be provided. Hence, any homework passed the due date extension deadline would not be accepted for grading. This is a direct class room instruction course.

Assignments and projects require students to actively use resources of the library. Detailed guide to business *resources of the library* as well as the description of Lincoln University approach to *information literacy* are available at the Center for Teaching and Learning website (ctl.lincolnuca.edu).

STUDENT CONDUCT

- Please participate. What you put into the class will determine what you get out of it – and what others get out of it.
- Please come **on time.** Late arrivals disturb everyone else. Plan to stay during the whole class period. Attendance may be taken at least one time in of each class. In the case where more than one attendance is taken, only students attending all attendances would be considered as present.
- Students may not read other materials (newspapers, magazines) during class, and no multitasking is allowed.
- Students are not allowed to come and go during class sessions.

- If you miss a class, you are responsible for getting notes/slide printouts on the material covered from a classmate in your group.
- To avoid distracting noise in class, cellular phones **must** be turned off or the ringing mode silenced.
- During the exam all recording devices of any form must be closed and stored in closed bags. (See also Examination Policy).
- All class participants are expected to exhibit respectful behaviors to other students and the instructor. All students have the right and privilege to learn in the class, free from harassment and disruption. Inappropriate or disruptive behavior will not be tolerated, nor will lewd or foul language.

EXAMINATION POLICY

The midterm would include only chapters covered in the lecture prior to the midterm and associated extra lecture information. The final is comprehensive. Unless otherwise informed, the exams are closed book exams, with some formulation may be supplied. There will not be a restroom break (or any other break) during the midterm or each of the parts of the final. (I will make alternative examination opportunities where the need for break is medically required and professionally supported by a letter from a medical doctor). No electronic instrument capable of copying material in any form (in particular, in print or visual image) is allowed in the exam. In particular, cell phones, organizers, calculators, tape recorders cameras, computers, etc. must be closed and stored inside a closed bag. A student violating these requirements should expect an F grade, in addition to other disciplinary consequences.

INDIVIDUAL RESEARCH PROJECT (1 unit)

Each student registered for a 400-level course must complete a one unit research project in addition to the coursework described in this syllabus. The specific topic will be assigned by the instructor.

The project requires 45 hours of self-study with regular consultations in accordance with the schedule determined by the instructor. The project work results in a written report (not less than 15 pages; APA style) and an oral presentation during the class session.

Evaluation of the student's work will be done using the following rubric:

WRITTEN REPORT				
	Exceeds Standards	*Meets Standards*	*Does Not Meet Standards*	*Not Present*
Research Problem Statement	The statement of a research problem is crystal clear, novel and thought provoking	Clearly and concisely identifies a research problem	The statement of a research problem is incomplete, lacking precision.	The statement of a research problem is absent.
Organization	The report is logically	The development of	Organization is confusing, disjointed,	The report lacks organization

	organized; ideas are exceptionally well-developed and support a thoughtful and engaging conclusion.	ideas is present; the conclusion is effective and directly addresses the original thesis.	and inconsistent; ideas, if present, are not developed; the conclusion is vague and/or does not address the original thesis.	
Sources and formatting	A variety of high-quality sources is used; all factual claims are supported with citations. The report follows the APA style guidelines.	A few high-quality sources are used; majority of factual claims are supported with citations The report mostly follows the APA style guidelines.	Sources used are of a questionable quality; factual claims are not supported. Use of APA style is inconsistent.	Sources are not identified or of a poor quality; factual claims are unsubstantiated. The report is poorly formatted

PRESENTATION			
	Exceeds Standards	*Meets Standards*	*Does Not Meet Standards*
Style and Organization	Presentation is clear, confident and fully engaging; the use of visual aids enhances its effectiveness; the presentation is well-timed and structured.	Presentation is clear; the use of visual aids is not detrimental to audience engagement; all necessary components are given appropriate time.	Presentation lacks clarity, no attempt is made to engage the audience; visual aids are haphazard and distracting; lack of structure results in an inefficient use of time.
Questions and Answers	Student demonstrates extensive knowledge of the topic by providing confident, precise and appropriate responses to all audience question.	Student demonstrates knowledge of the topic by responding adequately to questions of the audience.	Student demonstrates lack of knowledge of the topic by responding inaccurately and inappropriately to audience questions.

GRADING GUIDELINES

Class attendance	10 pts
Homework, assignments, and project	75 pts*
Midterm	30 pts
Final	60 pts
Total course points:	175 pts

*Assigned HW may in part be part of the project work. Project would accounts for at least 45points of the total course pts.

The grade will be based on a curve. Gaining the number of course points would assure the grade.

Course Points	Grade
148 course points and above	A
140-147	A-
122-139	B+
114-121	B
105-113	B-
96-104	C+
91-95	C
87 -90	C-
82-86	D+
78-81	D
Below 78	F

To gain a passing grade, a student must participate substantially in HW; this regardless of the student's exams' grade. Similarly the student must participate in both exams to receive a passing grade.

COURSE SCHEDULE

We will focus on elements in the following chapters in Robert S. Pindyck and Daniel L. Rubinfeld, *Econometric Models & Economic Forecasts*

8/21-8/23 *Introduction to Linear Regression*:
Linear regression with one and two independent variables.
Transformations. Criteria for statistical estimates and inference.
Basic Forecasting. (Ch(s) 1-3 and elements of 6).

8/21-8/30 *The Classical Multiple Regression Model:*
The general assumptions and nature of departure from assumptions.
Topics in the general model. (Ch 4).

9/4 *Relationships with Analysis of Variance and Dummy Variables*.
Testing hypotheses involving several parameters and constraints. (Ch. 5).

9/6 *Hetroscedasticity and serial correlation*. (Ch. 6).

9/13-9/20 *Errors in Variables and Missing variables:*
Specification and measurement problems.
The Instrumental Variables Technique. (Ch. 7).

9/18 *Midterm.*

9/27- 10/4 *Simultaneous Equations Models:*
Problems in identification and estimation. (Ch.11).

10/2 *Guest Lecture^^^*

10/4-10/9 *Forecasting based on Multiple regression.* (Ch. 8).

10/9 -10/11 *Time Series ARIMA forecasting* (Ch. 16, 17).

10/16 *Final Exam*

^ Further topics would be introduced
^^ I would try to accelerate the pace of the course if possible.
^^^An additional class meeting would be scheduled not on Tuesday and Thursday before the final for the individual and group presentation of the econometric studies. In addition, a guest lecture may be arranged on October 2nd.

Updated 8/19/2018. The syllabus would be updated in the future as necessary.