

THE UNIVERSITY OF  
WISCONSIN-MILWAUKEE  
Econ 513  
Introduction to Econometrics

Professor Chuan Goh

Spring 2017

## 1 Basic Information

- Lectures will be held on Tuesdays and Thursdays from 2:00 to 3:15 PM.
- These will take place in BOL 281 (3210 N. Maryland Ave.).
- Optional group sessions involving the use of the STATA computer package will be held on Fridays between 11:00 AM and 12:15 PM. These meetings will be announced in advance.

## 2 Instructor Contact Information

- Professor Goh will hold office hours on Tuesday and Thursday afternoons between 12:50 and 1:50 in BOL 870 (3210 N. Maryland Ave.). He is also available outside official office hours by appointment.
- He can be reached by e-mail at [goh@uwm.edu](mailto:goh@uwm.edu).

## 3 Required Textbook

The lectures in this course are based on the material covered in James H. Stock and Mark W. Watson, *Introduction to Econometrics*, Third Edition Update (2015),

Addison Wesley, ISBN 978-0-13-348687-2. The text is meant to be supplemented with material from the companion website, located at

[http://wps.aw.com/aw\\_stock\\_ie\\_3/178/45691/11696965.cw/index.html](http://wps.aw.com/aw_stock_ie_3/178/45691/11696965.cw/index.html).

In particular, the companion website includes solutions to all odd-numbered end-of-chapter exercises in the textbook, a tutorial on how to use the STATA software package as well as datasets for all the empirical exercises in the textbook.

Students are welcome to use earlier editions of the textbook for the purpose of studying the material. Homework problems, however, will be assigned from the third edition update.

## 4 Course Description and Intended Learning Outcomes

This course is an introduction to multiple regression analysis as it is most commonly applied to problems in economics, public policy and business. Basic methods of data analysis will be taught, and students will have opportunities to apply them to datasets drawn from real-world situations. Approximately one-third of the course will be devoted to reviewing relevant concepts from the theory of statistical inference.

This is a three-credit course. Students should expect to put in a minimum of five hours of study per week outside scheduled class meetings in order to achieve the learning goals of this course. This weekly minimum may be higher during the first six weeks of the semester for certain students.

## 5 Prerequisites

Junior standing or higher and a passing grade in Econ 413, or permission of the instructor. This course generally assumes that a student has already had some exposure to statistics in the form of an elementary course in business statistics, and is proficient in basic algebra. Calculus will not be used.

## 6 Homework

1. Problem sets will be assigned throughout the semester. **These assignments will not be graded**, but their completion will be essential for success on the

examinations.

2. Empirical exercises requiring the use of the computer and the STATA statistical package will also be required. **These assignments will be graded.** Further details will follow.

## 7 Grading Scheme

Student grades will be based on four components:

1. Midterm Examination 1 ( $M_1$ ), Thursday March 9th, 2:00–3:15 PM, BOL 281: A test based on the material covered in class up to **March 2nd**.
2. Midterm Examination 2 ( $M_2$ ), Thursday April 20th, 2:00–3:15 PM, BOL 281: A test based on the material covered in class from **March 2nd to April 13th**.
3. Final Examination ( $F$ ), Wednesday May 17th, 12:30–2:30 PM, BOL 281: This will be based on the material covered in class from **April 18th to May 11th**.
4. Computer assignments ( $C$ ).

The final grade ( $G$ ) in this course will be determined by the formula

$$G = 30\% \times (M_1 + M_2 + F) + 10\% \times C.$$

## 8 Policies on Missed Examinations

Please read the following notices carefully:

1. **There will be no “make-ups” for missing any of the three examinations.** Students will receive a grade of zero for missing an examination unless they receive an accommodation from the instructor. Proper documentation will be required.

Students who miss only one (1) examination and receive an accommodation will have their final grade determined by having their grades on the two examinations that were not missed count for 45% each of their final grade.

Students who miss more than one examination for any reason at all are strongly encouraged to take this course again at a later time.

2. Illness is the only generally acceptable reason for missing an examination. Students who are ill on the day of an exam should observe the following rules:

- (a) A note from a physician must be submitted to Professor Goh **within seven days** of the missed exam. This note must include the physician's full address in the form of a stamp, business card or official letterhead. The physician must also supply a daytime telephone number. A note that is missing any of this information will not be accepted.
- (b) The physician's note must establish that the student was examined and diagnosed at the time of the illness and not after the fact. A statement that merely confirms a report of illness made by the student for documentation by the physician will not be acceptable.

## 9 Policies on Missed Assignments

1. Computer assignments are due at the **start** of the lecture on the stated due date. Assignments must be submitted in person; electronic submission is not acceptable.
2. Late assignments will not be accepted for any reason; i.e., they will receive a grade of zero.
3. There will be no "make-up" assignments.

## 10 General University Policies

The UWM Faculty has adopted various general policies that govern the administration of this course. These policies are summarized on the document available at <http://uwm.edu/secu/wp-content/uploads/sites/122/2016/12/Syllabus-Links.pdf>.

Among other items, these policies govern the granting of accommodations for students with disabilities.

## 11 List of Topics

The aim is to cover most of the material in Chapters 3–9 of the textbook as well as a selection of material from Chapters 10–12. In general, only topics covered in both the lectures *and* the textbook will appear on the exams. A detailed listing follows:

1. Motivation; January 24, 26.

- (a) Introduction to the problem of drawing causal inferences from observational data; including examples of a randomized controlled experiment, a natural experiment and regression analysis of purely observational data

*Read Chapter 1*

2. Review of Statistical Theory (Chapter 3); January 31; February 2, 4, 7.
  - (a) Estimation of population means, tests of hypotheses regarding population means, confidence intervals regarding population means
  - (b) Tests regarding the difference between the means of two populations, causal inference using differences in means
  - (c)  $t$ -tests, scatterplots, sample covariances and sample correlations

*Read Chapter 3*

3. Simple Linear Regression: Estimation (Chapter 4); February 9, 14, 16.
  - (a) The simple linear model, the ordinary least squares (OLS) estimator
  - (b) Assessing lack of fit
  - (c) Sampling distribution of the OLS estimator

*Read Chapter 4*

4. Simple Linear Regression: Tests and Confidence Intervals (Chapter 5); February 21, 23.
  - (a) Testing hypotheses about a single regression coefficient, confidence intervals for a single regression coefficient
  - (b) What if  $X$  is binary?
  - (c) Heteroskedasticity, the Gauss-Markov Theorem,  $t$ -tests

*Read Chapter 5*

5. Multiple Linear Regression: Estimation (Chapter 6); February 28; March 2, 7, 14.
  - (a) Omitted variables bias (i.e., confoundedness), the general linear model, OLS estimation
  - (b) Assessing lack of fit
  - (c) Sampling distribution of the OLS estimator
  - (d) Multicollinearity

*Read Chapter 6*

6. Multiple Linear Regression: Tests and Confidence Intervals (Chapter 7); March 16, 28.
  - (a) Testing hypotheses about a single regression coefficient, confidence intervals for a single regression coefficient

- (b) Testing joint hypotheses about two or more regression coefficients, testing linear restrictions regarding two or more regression coefficients
- (c) Confidence sets for two or more regression coefficients
- (d) Model specification

*Read Chapter 7*

- 7. Nonlinear Regression Functions (Chapter 8); March 30; April 4, 6.
  - (a) Nonlinear regression functions, polynomials, logarithms
  - (b) Modelling interactions between independent variables

*Read Chapter 8*

- 8. Evaluation of Multiple Regression Analyses (Chapter 9); April 11, 13.
  - (a) Omitted variables bias, misspecification of the regression function, measurement error, missing data, selective samples, simultaneous causality

*Read Chapter 9*

- 9. Binary dependent variables (Chapter 11): April 18, 20
  - (a) The linear probability model
  - (b) Probit and logit

*Read Chapter 11*

- 10. Panel data (Chapter 10): April 25, 27; May 2
  - (a) Fixed effects regression with unit-specific dummies
  - (b) Fixed effects regression with unit and time-specific dummies

*Read Chapter 10*

- 11. Instrumental variables (Chapter 12): May 4, 9, 11
  - (a) General formulation
  - (b) Two-stage least squares
  - (c) Instrument validity

*Read Chapter 12*