# THE UNIVERSITY OF WISCONSIN-MILWAUKEE
## Econ 735
## Econometric Methods I

### Professor Chuan Goh

### Fall 2016

## 1    Basic Information

- Lectures will be held on Tuesdays and Thursdays from 11:00 A.M. to 12:15 P.M.

- Lectures will meet in BOL B80, 3210 N. Maryland Ave.

## 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 also be reached by e-mail at `goh@uwm.edu`.

## 3    Course Description and Intended Learning Outcomes

This course is concerned with methods of microeconometric analysis, which involves the statistical analysis of data on the economic behavior of individual

workers or distinct firms. The level of presentation is relatively advanced due to various complications that arise naturally in the analysis of microeconomic data. For example:

1. Individual-level data are often discrete or censored, thus necessitating the use of nonlinear statistical methodology including logit, probit or Tobit methods. Statistical inference using nonlinear methods typically involves the application of relatively advanced concepts in asymptotic approximation theory.

2. Individual-level data typically involve deviations from random sampling like heteroskedasticity or clustering. These complications make the computation of appropriate standard errors difficult. It is desirable to formulate standard errors that are robust to the presence of such complications.

3. Economists and practitioners in related disciplines often work with observational, as opposed to experimental data. At the same time, considerable interest is often focused on the existence or nature of causal relationships between variables in observational datasets. This leads to the application of statistical methods intended to tease out patterns of causation in observational data such as instrumental variables, corrections for measurement error, corrections for selection bias, fixed effects for panel data and differences-in-differences.

4. Microeconomists typically work with survey datasets that are subject to problems that involve departures from simple random sampling, including selection bias, measurement errors and incomplete or missing data. The accommodation of such issues in complex surveys requires the use of advanced methods.

5. It is often the case that two or more of the complications listed above occur simultaneously in the same dataset. For example, consider a logistic regression in panel data with endogenous regressors. Dealing with such problems often requires practitioners to be able to read the recent literature in theoretical econometrics or be able to adapt standard statistical software packages in an appropriate way.

This is a three credit course. Students should expect to put in a minimum of six hours of study per week outside scheduled class meetings in order to achieve the learning goals of this course.

# 4  Teaching Material

No textbook is required for this course. Some of the material presented in class will be reinforced in handouts to be given out at appropriate intervals.

The following is a list of (optional) textbooks that may be helpful in reinforcing course material as it is presented in class:

- (introductory graduate textbook) Fumio Hayashi (2000), *Econometrics*, Princeton University Press, ISBN 9780691010182

- (comprehensive survey of theory and applications, relatively recent) Jeffrey M. Wooldridge (2010), *Econometric Analysis of Cross Section and Panel Data*, Second Edition, MIT Press, ISBN 9780262232586

- (comprehensive survey of theory and applications, not so recent) A. Colin Cameron and Pravin K. Trivedi (2005), *Microeconometrics: Methods and Applications*, Cambridge University Press, ISBN 9780521848053

- (mostly theoretical, somewhat outdated) Takeshi Amemiya (1985), *Advanced Econometrics*, Harvard University Press, ISBN 9780674005600

- (focus on panel data methodology) Manuel Arellano (2003), *Panel Data Econometrics*, Oxford University Press, ISBN 9780199245291

# 5  Prerequisites

Offically: A passing grade in Econ 734. Unofficially: Consent of the instructor. This course assumes at minimum a good understanding of linear regression analysis with matrix algebra at the level of Chapters 1–2 of *Econometrics* by Hayashi (2000). This course also assumes prior exposure to asymptotic approximation theory at the level of Chapter 2 of Hayashi (2000) as well as prior exposure to mathematical arguments and proofs.

# 6  Homework

Problem sets based on theoretical concepts covered in class will be assigned throughout the semester. **These assignments will not be graded**, but their completion will be essential for success on the examinations.

# 7  Grading Scheme

Student grades will be based on three components:

1. Midterm Examination ($M$), Thursday October 27th, 11:00 A.M. –12:15 P.M., BOL B80: A test based on the material covered in class up to **October 20th**.

2. Final Examination ($F$), Wednesday December 21st, 10:00 A.M.–12:00 P.M., BOL B80. This will be based on all material covered in class during the semester.

The final grade ($G$) in this course will be determined by the formula $G = .35 \times M + .65 \times F$.

# 8  Policies on Missed Examinations

Please read the following notices carefully:

1. **There will be no "make-ups" for missing either examination**. 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 the midterm examination and receive an accommodation will have their final grade determined by their grade on the final examination.

   Students who miss the final examination or 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 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://www4.uwm.edu/secu/news_events/upload/Syllabus-Links.pdf`.
Among other items, these policies govern the granting of accommodations for students with disabilities.

# 10 List of Topics

The aim is to cover the following material in the following order.

1. Linear models: September 6, 8, 13

   (a) Ordinary least squares

   (b) Weighted least squares

   (c) Consequences of model misspecification

   (d) Instrumental variables

   *Read or re-read ECON 734 Handouts 1–2*
   *Read or re-read Hayashi (2000), Chapters 2–3*

2. Extremum estimation: September 15, 20, 22

   (a) General considerations, nonlinear least squares

   (b) Maximum likelihood

   *Read or re-read ECON 734 Handouts 6–7*
   *Read or re-read Hayashi (2000), Chapters 7–8*

3. Numerical optimization: September 27 *Read e.g., Wooldridge (2010), Section 12.7*

4. Nonlinear models (discrete dependent variables): September 29; October 4, 6

   (a) Binary outcome models

   (b) Multinomial models

   *Read e.g., Wooldridge (2010), Chapters 15–16*

5. Nonlinear models (censored dependent variables): October 11, 13, 18

   (a) Censoring and truncation of the dependent variable

   (b) Selection bias

   *Read e.g., Wooldridge (2010), Chapters 17, 19*

6. Generalized method of moments: October 20, 25

    (a) Single-equation GMM

    (b) Multiple-equation GMM

    *Read or re-read Hayashi (2000), Chapters 3–4*

7. Tests of hypotheses: November 1, 3

    (a) Tests based on maximum likelihood

    (b) Tests not based on maximum likelihood

    *Read or re-read ECON 734 Handout 7, Section 5*
    *Read or re-read Hayashi (2000), Section 7.4*

8. Linear panel data: November 8, 10, 15, 17, 22, 29

    (a) Fixed vs. random effects

    (b) Pooled models

    (c) GMM estimation of linear panel data models

    (d) Dynamic linear panels

    (e) Difference-in-differences

    *Read e.g., Hayashi (2000), Chapter 5*
    *Read e.g., Wooldridge (2010), Chapters 10–11*

9. Nonlinear panel data: December 1, 6, 8

    (a) Panels with binary outcomes

    (b) Panels with censored outcomes

    *Read e.g., Wooldridge (2010), Sections 15.8, 17.8, 19.9*