THE UNIVERSITY OF WISCONSIN-MILWAUKEE
Econ 734
Foundation of Econometric Methods

Professor Chuan Goh

Spring 2017

1 Basic Information

- Lectures will be held on Tuesdays and Thursdays from 11:00 AM to 12:15 PM.
- Lectures will meet in NWQ B G578 (2025 E. Newport 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 be reached by e-mail at `goh@uwm.edu`.

3 Required Textbook

The lectures in this course are generally based on material covered in Fumio Hayashi, *Econometrics* (2000), Princeton University Press, ISBN 0-691-01018-8. This text is meant to be supplemented with material from the companion website, located at

http://fhayashi.fc2web.com/hayashi_econometrics.htm.
The companion website includes solutions to most of the exercises in this textbook. Many exercise solutions not available on the website can be found at the end of the corresponding textbook chapter.

4 Course Description and Intended Learning Outcomes

This course is a rigorous introduction to modern econometric methods. The focus is on the statistical properties of estimators and test statistics that have proven to be popular in empirical economics.

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

5 Prerequisites

Officially: Graduate standing and passing grades in Econ 413 and Econ 506, or permission of the instructor. *Perhaps more relevant:* This course assumes that the prospective student has already passed an introductory graduate course in probability theory, mathematical statistics and regression analysis at the level of the material presented in ECON 458, which was taught by Professor Goh during the Fall semester. Students who are uncomfortable with the assumed prerequisite material at the standard required should consult the instructor regarding remedial reading and exercises during the first week of the semester.

6 Homework

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.

7 Grading Scheme

Student grades will be based on three components:

1. Midterm Examination 1 (M_1), Thursday March 9th, 11:00 AM–12:15 PM, NWQ B G578: A test based on the material covered in class up to **February 23rd**.

2. Midterm Examination 2 (M_2), Thursday April 20th, 11:00 AM–12:15 PM, NWQ B G578: A test based on the material covered in class from **February 28th to April 6th**.

3. Final Examination (F), Tuesday May 16th, 10:00 AM–12:00 PM, NWQ B G578. This will be based on the material covered in class from **April 11th to May 11th**.

The final grade in this course will be determined by the average of the grades attained on M_1, M_2 and F.

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 as the average of the grades attained on the two examinations actually written.

   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 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.

10 List of Topics

The aim is generally to cover the material in Chapters 2, 3, 4 and 5 of the Hayashi textbook, along with relevant supplementary material contained in several handouts. A detailed listing follows. This is naturally subject to change:

1. Stochastic convergence (instructor handouts): January 24, 26, 31; February 2, 7, 9
   (a) Convergence of random vectors
   (b) Stochastic convergence for time series

   Read Handout 1, Sections 1–7
   Read Handout 2, Sections 1–5
   Read Hayashi, Sections 2.1 and 2.2
2. Conditional expectations and linear prediction (instructor handout):
   (a) Computation of conditional expectations
   (b) Linear regressions with an intercept
   (c) Best linear prediction

   Read Handout 3
3. Large-sample analysis of the linear regression model (Hayashi, Chapter 2): February 14, 16, 21
   (a) Asymptotic behavior of ordinary least squares (OLS)
   (b) Hypothesis tests based on the asymptotic behavior of OLS
   (c) Conditional homoskedasticity
   (d) Serial correlation
   (e) Empirical example: Testable implications of Fama's efficient market hypothesis

   Read Hayashi, Sections 2.3–2.7, 2.10, 2.11
4. Instrumental variables (Hayashi, Chapter 3): February 23, 28; March 2, 7, 14

(a) Classic illustrative examples

(b) Instrumental variables and the generalized method of moments (GMM)

(c) Asymptotic distribution theory for linear GMM estimators

(d) Tests of overidentifying restrictions

(e) Statistical inference using the distance-metric or likelihood-ratio principles

(f) Conditional homoskedasticity

(g) Empirical example: Estimates of the causal return to schooling

Read Hayashi, Chapter 3, skipping the section on the "Variable Addition Test" (pp. 224–225)

5. Systems of linear equations (Hayashi, Chapter 4): March 16, 28, 30; April 4

   (a) The basic setup and formal definition

   (b) Asymptotic distribution theory for multiple-equation linear GMM

   (c) Comparison between single-equation and multiple-equation linear GMM

   (d) Important special cases

   (e) Models with common coefficients

   (f) Empirical example: Estimates of a system of linear factor-demand equations

   Read Hayashi, Chapter 4

6. Panel data (Hayashi, Chapter 5): April 6, 11, 13, 18

   (a) Error components

   (b) Fixed effects

   (c) Empirical example: International differences in growth rates

   Read Hayashi, Sections 5.1–5.2, 5.4

7. Asymptotic analysis of extremum estimators: April 20, 25, 27; May 2, 4, 9, 11

   (a) Consistency of extremum estimators under random sampling

   (b) Asymptotic normality of extremum estimators under random sampling

   (c) Maximum likelihood estimation

   (d) Nonlinear least squares

   (e) Iterative methods

   (f) Likelihood-ratio and related asymptotic testing procedures

   (g) Regression quantiles

   Read Handout 8