

**Duke University**  
**Department of Economics**  
**Federico A. Bugni**  
**ECON 703 - Fall 2018**  
**First year graduate econometrics**

## 1 Contact information

My contact information is as follows:

- *Office:* Social Sciences 240
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- *Homepage:* <https://sites.duke.edu/federicobugni/>
- *Office hours:* (tentative) Mon 3:00 PM – 5:00 PM or by email appointment.

The TAs of the course are:

- Qiushi Zhang, *E-mail:* [qiushi.z@duke.edu](mailto:qiushi.z@duke.edu)
- Congshan Zhang, *E-mail:* [congshan.zhang@duke.edu](mailto:congshan.zhang@duke.edu)
- *Office hours:* (tentative) Qiushi: Wed 3:00 PM – 4:00 PM and Congshan: Wed 4:00 PM – 5:00 PM.

## 2 Class time and place

- *Lectures:* Tu,Th 10:05 AM – 11:20 AM in Sociology Psychology 126
- *TA session #1:* Th 6:15 PM – 7:05 PM in Languages 207
- *TA session #2:* Th 7:30 PM – 8:20 PM in Gray 228
- *Course website:* <https://sakai.duke.edu/portal>

## 3 Course Description

Econ 703 is the first course in the graduate sequence in econometrics. The course is composed of two parts: statistics and econometrics. In the first part, statistics, we introduce the necessary tools and techniques that are essential in econometric analysis. In the second part, econometrics, we study the estimation and inference of several econometric models. To achieve this, we make extensive use of the statistical tools and techniques developed in the first part of the course.

## 4 References

### 4.1 Statistics

- Main reference: [Casella and Berger \(2002\)](#) (referred to as “CB”).
- Additional references: [Billingsley \(1995\)](#), [Resnick \(1999\)](#), [Rice \(1995\)](#).

### 4.2 Econometrics

- Main reference: [Hayashi \(2000\)](#) (referred to as “H”).
- Additional references: [Amemiya \(1985\)](#), [Wooldridge \(2002\)](#), [Stock and Watson \(2007\)](#), [Greene \(2012\)](#).

## 5 Grading scheme

- The course grade is the result of problem sets (10%), midterm exam (30%), and final exam (60%).
- *Midterm exam*: Thursday, October 11, 10:05 AM – 11:20 AM, in the lecture classroom.
- *Final exam*: Sunday, December 14, 2:00 PM – 5:00 PM, in the lecture classroom.

## 6 Problems sets

- There will be a problem set (approximately) every week.
- The problem sets are (typically) due on Thursday before the TA section.
- The problems sets will be discussed in TA sections.
- You are encouraged to work on the problems sets in groups, but individual solutions sets are required.
- The problem sets will contain both theoretical and empirical questions. You are free to use any statistical/econometric software available for empirical questions.

## 7 Overview of the course

### 1. Statistics:

- (a) Probability theory: axiomatic approach, conditional probability, independence, etc.  
CB: Chapter 1.1-1.3
- (b) Random variables, distribution functions: joint, conditional, marginal.  
CB: Chapter 1.4-1.6, 4
- (c) Properties of random variables: moments, independence, correlation, etc.  
CB: Chapter 1.5-1.6, 2
- (d) Selected probability distributions  
CB: Chapter 3, 4
- (e) Introduction to inference: finite sample inference and large sample inference.  
CB: Chapter 5

- (f) Large sample inference  
CB: Chapter 5, 10.1
  - (g) Estimators: consistency, asymptotic normality, efficiency, and asymptotic efficiency.  
CB: Chapter 7
  - (h) A good estimator: maximum likelihood estimator (MLE).  
H: Chapters 7, 8
  - (i) Hypothesis testing: introduction and likelihood ratio test.  
CB: Chapter 8, 9
2. Econometrics:
- (a) Classical linear regression theory.  
H: Chapter 1
  - (b) Small sample results for the linear regression model.  
H: Chapter 1
  - (c) Large sample results for the linear regression model.  
H: Chapter 2
  - (d) Generalized method of moments (GMM): identification and asymptotic properties.  
H: Chapter 3

## 8 Some final remarks...

- There are no TA sections on Thursday, August 30. The first TA section is Thursday, September 6.
- This plan (structure, dates, problem sets, required readings, etc.) is subject to changes. These will be announced by Sakai email.
- Class participation is considered mandatory.

## References

- AMEMIYA, T. (1985): *Advanced Econometrics*, Harvard University Press.
- BILLINGSLEY, P. (1995): *Probability and Measure*, John Wiley and Sons, Inc.
- CASELLA, G. AND R. L. BERGER (2002): *Statistical Inference*, Duxbury.
- GREENE, W. (2012): *Econometric Analysis: Seventh Edition*, Prentice Hall.
- HAYASHI, F. (2000): *Econometrics*, Princeton University Press.
- RESNICK, S. I. (1999): *A Probability Path*, Birkhauser.
- RICE, J. (1995): *Mathematical Statistics and Data Analysis*, Wiley.
- STOCK, J. H. AND M. W. WATSON (2007): *Introduction to Econometrics*, Pearson Education, Inc., 2nd edition ed.
- WOOLDRIDGE, J. (2002): *Econometric Analysis of Cross Section and Panel Data*, MIT Press.