

# AEB 7571

## Econometric Methods I

**Purpose:** This course develops statistical foundations that will be used in microeconomic theory, econometrics, production economics, and financial economics. The development focuses primarily on the mathematical formulation of statistics.

**Instructor:** Charles B. Moss  
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**Overview:** Course grades will be assigned based on weekly homework, three examinations and class participation. Homework will be due in a week increment. Each assignment will be handed out at the beginning of each increment and will involve topics covered over that time span.

**Office Hours:** My office hours are Monday and Wednesday from 10:45 – 12:00. If these times are not convenient please make an appointment, or stop by my office.

**Textbooks:** There are two books used in this course:

Moss, Charles B. 2014. *Mathematical Statistics for Applied Econometrics*. Boca Raton, Florida: CRC Press.

Salsburg, D. 2002. *A Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century*. New York: Holt Paperbacks.

**Supplementary Material:** Materials such as lecture notes will be made available on the Internet at <http://www.charlesbmoss.com:8080/econometrics.mathstat/>.

**Grading:** Grades will be assigned according to the following weights

Course Grade Weights	
Activity	Percent of Final Grade
Homework	15 %
Two Midterm Examinations	50%
Final Examination	30%
Class participation	5 %

Grades will be assigned based on the following scale

Grading Scale *		
Grade	Percentage of Total Points	Numeric GPA
A	96-100	4.00
A-	92-96	3.67
B+	88-92	3.33
B	84-88	3.00
B-	80-84	2.67
C+	76-80	2.33
C	72-76	2.00
C-	68-72	1.67
D+	64-68	1.33
D	60-64	1.00
D-	56-60	0.67
E	<56	0

\*I reserve the right to lower the scale for any grade level.

## **Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities**

In 1995 the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from

the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court. (*Source: 2007-2008 Undergraduate Catalog*)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

## **Software Use**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

## **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. Both the Counseling Center and Student Mental Health Services provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

1. *University Counseling Center*, 301 Peabody Hall, 392-1575, [www.counsel.ufl.edu](http://www.counsel.ufl.edu)
2. *Career Resource Center*, CR-100 JWRU, 392-1602, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)
3. *Student Mental Health Services*, Rm. 245 Student Health Care Center, 392-1171, [www.shcc.ufl.edu/smhs/](http://www.shcc.ufl.edu/smhs/)

Alcohol and Substance Abuse Program (ASAP)

Center for Sexual Assault / Abuse Recovery & Education (CARE)

Eating Disorders Program

Employee Assistance Program

Suicide Prevention Program

**Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

# Outline

## I. Introduction

- A. Defining Mathematical Statistics [Moss 1, Salsburg 1]
- B. Introduction to Statistics, Probability, and Econometrics [Moss 2, Salsburg 2]

## II. Random Variables and Probability Distributions

- A. Random Variables and Probability Distributions: I [Moss 3.1 – 3.4, Salsburg 3]
- B. Random Variables and Probability Distributions: II [Moss 3.5 – 3.7, Salsburg 4]
- C. An Applied Sabbatical [Moss 3.8, Salsburg 5]
  - 1. Basics of Crop Insurance - Nelson, C.H. 1990. The Influence of Distributional Assumptions on the Calculation of Crop Insurance Premia. *North Central Journal of Agricultural Economics* 12(1): 71–78.
  - 2. Estimating Distribution Functions of Crop Yields - Moss, C.B. and J.S. Shonkwiler. 1993. Estimating Yield Distributions with a Stochastic Trend and Nonnormal Errors. *American Journal of Agricultural Economics* 75(4): 1056-62.
  - 3. Comparing Distribution Functions Out-Of-Sample - Norwood, B., M.C. Roberts, and J.L. Lusk. 2004. Ranking Crop Yield Models Using Out-of-Sample Likelihood Functions. *American Journal of Agricultural Economics* 86(4): 1032–43.

## III. Moments and Moment Generating Functions

- A. Mean and Higher Moments [Moss 4.1 – 4.2, Salsburg 6]
- B. Moments of More than One Random Variable [Moss 4.3 – 4.4, Salsburg 7]
- C. Moment Generating Functions [Moss 4.5, Salsburg 8]

## IV. Binomial and Normal Random Variables

- A. Binomial Random Variables [Moss 5.1, Salsburg 9]
- B. Normal Random Variables [Moss 5.2 – 5.3, Salsburg 10]
- C. Bivariate and Multivariate Normal Random Variables [Moss 5.4, Salsburg 11]

## Test I

## V. Large Sample and Asymptotic Theory

- A. Large Sample Theory [Moss 6.1 – 6.2, Salsburg 12]
  - 1. White, H. 199. *Asymptotic Theory for Econometricians* Revised Edition. San Diego, California: Academic Publishers.
- B. Limits and the Law of Large Numbers [Moss 6.3 – 6.5, Salsburg 13]
  - 1. Almost Sure Convergence (White Chapter II)
  - 2. Asymptotic Normality (White Chapter III)
- C. Empirical Examples of the Central Limit Theorem [Salsburg 14]

**VI. Point Estimation**

- A. Definition of an Estimator [Moss 7.1 – 7.2, Salsburg 15]
- B. Properties of Estimators and Sufficient Statistics [Moss 7.3 – 7.4, Salsburg 16]
- C. Concentrated Likelihood Functions, Normal Equations, and Properties of Maximum Likelihood [Moss 7.5 – 7.7, Salsburg 17]

**VII. Interval Estimation**

- A. Interval Estimation [Moss 8.1]
- B. Bayesian Estimation and Confidence Intervals [Moss 8.2 – 8.3, Salsburg 18]

**VIII. Testing Hypotheses**

- A. Type I and Type II Errors and the Neyman-Pearson Lemma [Moss 9.1 – 9.2, Salsburg 19]
- B. Composite Tests and the Likelihood Ratio Tests [Moss 9.3 – 9.6, Salsburg 20]
- C. Examples and Multivariate Testing [Salsburg 21]

**Test II**

**IX. Elements of Matrix Analysis**

- A. Review of Matrix Algebra and Vector Spaces [Moss 10.1 – 10.3, Salsburg 22]
- B. Vector Spaces and Eigenvalues [Moss 10.4 – 10.5, Salsburg 23]

**X. Bivariate and Multivariate Regression**

- A. Simple Linear Regression [Moss 11.1, Salsburg 25]
- B. Distribution of Estimates and Multivariate Regression [11.2 – 11.5, Salsburg 28]

**Final Examination – December 12, 12:30 – 2:30pm**