Measurement & Analysis of Economic Activity (ECO 3410)  
U02-88529  
Department of Economics, Florida International University (MMC)  
Fall 2019 (Aug 26 – Dec 07)

Instructor: Prasad Bidarkota  
Lectures: T, R 12:30-13:45 in DM 110  
Office Hours: T, R 09:50-10:50 am in DM 320A and by appointment

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Textbook  

The textbook is required reading material and all students are expected to obtain personal copies for use in this course.

Prerequisites  
The formal prerequisites for this course are STA 2023 / STA 2122.

Note: You should NOT take the course at this time if:  
• You do not satisfy the above prerequisites, or  
• You have a final exam conflict

Course Objectives  
Here is the Course Description from FIU Undergraduate Course Catalog 2017-18 -- ECO 3410 Measurement and Analysis of Economic Activity (3). Covers statistical methods as applied in economics. Topics include estimation and hypothesis testing, analysis of variance, and single and multiple regression models. Prerequisites: STA 2023 or equivalent. Satisfies requirement in computer literacy. (F,S) The course prepares students for a rigorous study of regression analysis. Continuing with the material from STA 2023 / STA 2122, we introduce various techniques for exploratory data analysis. We learn several important discrete and continuous random variables in some detail, point and interval estimation, and hypothesis testing. At the end of the course, students will be well placed to undertake further studies in econometrics such as Eco 4421.
Please also find attached to this syllabus a departmental document providing guidelines on course content.

Assessment
The course assessment will consist of several homework and computer assignments together worth 20%, two midterm examinations worth 20% each, and a final exam worth 40%.

The midterms will be held during regular lecture hours roughly after the 6th and 12th weeks.

Final examination will be held on Tuesday Dec 10 from 12 noon until 2:00 pm in DM 110.

Guidelines for Submitting Homework and Computer Assignments
Homework and computer assignments will be given throughout the semester on all major topics covered in the course. Each assignment will consist of several questions, analytical and computational, frequently from the back of the chapters in the textbook. Students are responsible for answering all the questions assigned for each homework.

Students are encouraged to work in collaboration with a partner on their homework and computer assignments. Only one copy of the homework / computer assignment is to be handed in between every two students.

Although I do not expect typed homework submissions, these nevertheless have to be neatly written, stapled, concise yet complete, and include all relevant computer output where appropriate.

Solutions to the homework questions will be discussed in class.
Late assignments will not be accepted for any reason whatsoever.

Makeup Examination
There will be no makeup examination under any circumstances.

Grades
The final course grade will be based on the cumulative total score in the course comprising of the scores on the homework and computer assignments, midterm, and the final exam. Letter grades will be based on the distribution (“curve”) of these final scores of all students in the course. Depending on the overall performance of the students, the minimum total score required to obtain a particular grade (“the cutoff”) will be determined at the end of the semester.
Learning Objectives

- Explain the difference between discrete and continuous random variables.
- Compute probabilities of events, given the probability density function for a discrete or continuous random variable.
- Define, compute, and interpret key descriptive statistics.
- Graph and explain relationships between variables.
- Understand the difference between a population and a sample, and why samples are used as a basis for inference about population parameters.
- Understand the difference between the population mean and the sample mean, and explain the difference between an estimate and an estimator.
- Describe the central limit theorem, and its implications for statistical inference.
- Explain the difference between point and interval estimation, and construct and interpret interval estimates of a population mean given a sample of data.
- Explain the difference between one-tail tests and two-tail tests, describing when one is preferred to the other.
- Execute statistical analyses with modern, professional, statistical software (R, Stata, Python).

Course Coverage

1. Probability
   1.1. Basics
      - Sample Spaces and Events
      - Event Algebra
      - Axioms of Probability
   1.2. Conditional Probability and Independence
      - Conditional Probability
      - Independence
      - Bayes' Theorem
   1.3. Random Variables and Their Distributions
      - Discrete Random Variables
         - Probability Mass Function
         - Cumulative Distribution Function
      - Continuous Random Variables
         - Probability Density Function
         - Cumulative Distribution Function
   1.4. Parameters of a Distribution
      - Expected Value
      - Variance
      - Standard Deviation
      - Skewness
1.5. Gaussian Distribution
   - Standard Normal Distribution
   - Percentiles of the Normal Distribution

1.6. Other Distributions (Optional)
   - Discrete (Bernoulli, Binomial, Poisson, Hypergeometric, Geometric)
   - Continuous (Uniform, Exponential, Gamma, Beta)

2. Summarizing Data
   2.1. Summary Statistics
      - Min/Max
      - Central Tendency (Mean and Median)
      - Measures of Dispersion (Quartiles, Range, Variance and Standard Deviation)
      - Skewness and Kurtosis

   2.2. Graphing Data
      - Histogram
      - Stem and Leaf Plot
      - Box and Whiskers Plot
      - Scatter Plot
      - Quantitle (Q-Q) Plot
      - Time Series Plot with Moving Average (Optional)

3. Random Sampling
   3.1. Sampling Distribution of the Sample Mean
      - Central Limit Theorem
      - Monte Carlo Simulation

   3.2. Sampling Distribution of the Sample Variance/Proportion
      - Chi-Squared Distribution

   3.3. Student t-Distribution

   3.4. Fisher’s F-Distribution

4. Inference
   4.1. Point Estimation
      - Bias, Variance, and Mean Squared Error

   4.2 Confidence Interval (CI) Estimation
      - Two-Sided CI
      - One-Sided CI

   4.3. Hypothesis Testing
      - Formulating Null and Alternative Hypotheses
      - Type I and Type II Errors

   4.4. Level of Significance and P-Value
4.5. Statistical Significance vs. Practical Significance

5. Inference for Single Samples (Examples)
   5.1. Hypothesis Tests on Mean (Two-Sided and One-Sided) for Large Samples
   5.2. Hypothesis Test on Mean (Two-Sided and One-Sided) for Small Samples
   5.3. Hypothesis Test on Variance/Proportion

6. Compulsory data project using a modern statistical software package.