Econometrics I  “Statistical Foundations” (E571)  

Fall 2010 Syllabus

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Class meeting: TR 10:30-11:45 am  
at IT 065  
Office Hours: T 2:00-4:00 pm and by appointment.

Course objectives:  
This course introduces the fundamental concepts of probability and statistical theory. The course is mainly designed for the first year graduate students and intends to provide the basic statistical tools that will be used in later econometrics courses.

Prerequisites:  
One year of calculus is required. The equivalent of Math M165, M166 or above is preferred.

Required text:  

Recommended texts:  

Grading:  
Your final grade in the class will be determined by the following grading scale.  
Homework (30 percent)  
Midterm (30 percent)  
Final (40 percent)

Homework:  
Homework will be assigned on a regular schedule. Students are welcome to discuss the homework with classmates. However, each student has to write his/her own answers. Do not just copy others. Not mentioning it is not just a misconduct, it is not worth doing because eventually you will have to solve the midterm and final exams on your own. No late homework will be accepted.

Exams:  
There will be one midterm exam and one final exam. No excuse other than extreme emergency will be accepted for missing a midterm exam. If an emergency does arise, please email me before the midterm exam to inform me of the problem. In the midterm exams, you will be permitted to bring in a single sheet (two-sided, 8x11) of notes and a calculator; no textbooks, computers, cell phones, iPAQs, iPODs, etc. The final exam is scheduled at 10:30 am -12:30 pm on Dec. 16 by the University.
Feedback:
I highly encourage you to provide me with feedback as we progress through the semester. Good communication is essential to make sure the course runs as smoothly as possible. You can come to my office hour, send emails to me, and leave feedback on my mailbox anonymously.

Academic Integrity:
Indiana University-Purdue University Indianapolis has a Code of Student Conduct, administered by the office of the Dean of Students. This Code sets standards for academic integrity at IUPUI for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism.
Course Outline:
(26 lectures excluding first meeting and midterm exam)

1. **Probability Theory (4)**
   - Set theory, Sample space
   - Counting, conditional probability, independence
   - Probability space (sigma algebra), Random variable
   - Cdf, pdf, pmf

2. **Transformation and Expectations (3)**
   - Transformation
   - Moments, MGF

3. **Common Families of Distributions (4)**
   - Discrete distribution
   - Continuous distribution
   - Exponential families
   - Inequalities, Inequalities II(from chap4)

4. **Multiple Random Variables (3)**
   - Joint and marginal distribution
   - Transformation II
   - Covariance, correlation

**Midterm exam** Oct 14, Thursday, 10:30AM-11:45AM

5. **Properties of a Random Sample (4)**
   - Sampling distribution from normal
   - Convergence concepts - as convergence, Convergence in probability, Convergence in distribution, LLN, CLT

6. **Point Estimation (4)**
   - MOM, MLE
   - MSE, bias, Cramer-Rao inequality
   - Decision theoretic approach - Optimality, Loss function, Risk function

7. **Hypothesis Testing (4)**
   - LR test, Evaluating test, P-values, Power function
   - Neyman-Peason Lemma

**Final exam** Dec16, Thursday, 10:30AM-12:30PM