

SYLLABUS  
EC 400: September Introductory Course  
Probability and Statistics

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September 2010

- This course intends to provide students with the essential background in probability and statistics for the core courses of the MSc Economics programme.
- The textbook for this course is:  
Larsen, Richard and Marx, Morris, “An introduction to mathematical statistics and its applications”, 4<sup>th</sup> edition, Prentice Hall.
- For plenty of exercises, the Schaum’s Outline series has:  
Spiegel, M., Schiller, J. and Srinivasan, A., “Schaum’s Outlines: Probability and Statistics”, 2<sup>nd</sup> edition, McGraw Hill.
- This is an intensive course: 10 lectures and 10 classes (starting Tuesday) will take place in 2 weeks. So, keeping up to date with the material and solving problem sets in time may be a demanding task.

**Topics covered:**

1. Random variables and probability distributions
  - (a) Sample space and events
  - (b) Probability function
  - (c) Conditional probability and independence of events
  - (d) Random variables
2. Moments of a random variable
  - (a) Expectation
  - (b) Higher order moments
  - (c) Percentiles and mode
3. Some frequently used distributions
  - (a) Discrete distributions
  - (b) Continuous distributions

4. Joint, marginal and conditional distributions
  - (a) Joint distribution
  - (b) Marginal distribution
  - (c) Conditional distribution
  - (d) Covariance and independence of random variables
5. Functions and transformation of a random variable
  - (a) Distribution of a function of a discrete random variable
  - (b) Distribution of a function of a continuous random variable
  - (c) Expectations of functions of random variables
  - (d) Special transformation cases:
  - (e) The law of large numbers
  - (f) The central limit theorem
6. Inference
  - (a) Sampling
  - (b) Properties of estimators
  - (c) Methods of estimation
  - (d) Point versus Interval Estimate
7. Hypothesis testing
  - (a) Basic definitions
  - (b) Tests of the mean
  - (c) Tests of the variance
  - (d) Hypothesis testing and confidence intervals
8. Univariate regression
  - (a) Model definition and assumptions
  - (b) Ordinary least squares
  - (c) Maximum likelihood
  - (d) Inference