STAT 401 (13617, 20466)

Introduction to Probability

Fall Semester 2011

Last update: 08/15/2011

Course Announcement

Time: Monday, Wednesday, Friday at 12:00 - 12:50 p.m.
Location: Behavioral Sciences Building 337

Instructor: Jie Yang, SEO 513
Office Hours: Monday, Wednesday, Friday at 1:00 - 2:00 p.m.

Textbook: R. V. Hogg, J. W. McKean, A. T. Craig, *Introduction to Mathematical Statistics*, 6th edition, 2005
Content: Probability spaces, random variables and their distributions, conditional distribution and stochastic independence, special distributions, sampling distributions, limit theorems
Prerequisite: Grade of C or better in MATH 210

Homework: Turn in every Wednesday before class; half of the grade counts for completeness; half of the grade counts for correctness of one selected problem
Midterms: September 30th and November 11th, Friday, 12:00 p.m. - 12:50 p.m.
Final Exam: (pending...)
Grading: Homework 10%, midterms 25% each, final exam 40%
Grading Scale: 95% A , 85% B , 75% C , 65% D

Format of All Exams: Each exam is based on the homework and the examples discussed in class. The last class session before each exam is a review session. Please prepare any questions that you may have.

No makeup exam will be given without a valid excuse.

Course Syllabus

WEEK	SECTIONS	BRIEF DESCRIPTION
08/22 - 08/26	1.1; 1.2; 1.3	Introduction; Set Theory; Probability Set Function
08/29 - 09/02	1.3; 1.4; 1.4	Probability Set Function; Conditional Probability and Independence

09/05 - 09/09	Holiday; 1.5; 1.5	Random Variables
09/12 - 09/16	1.6; 1.7; 1.8	Discrete Random Variables; Continuous Random Variables; Expectation of a Random Variable
09/19 - 09/23	1.9; 1.10; 2.1	Special Expectations; Important Inequalities; Distributions of Two Random Variables
09/26 - 09/30	2.1; Review; **Midterm-1**	Distributions of Two Random Variables
10/03 - 10/07	2.2; 2.2; 2.3	Transformation: Bivariate Random Variables; Conditional Distributions and Expectations
10/10 - 10/14	2.3; 2.4; 2.5	Conditional Distributions and Expectations; Correlation Coefficient; Independent Random Variables
10/17 - 10/21	2.6; 2.7; 2.7	Extension to Several Random Variables; Transformations: Random Vectors
10/24 - 10/28	3.1; 3.2; 3.3	Binomial and Related Distributions; Poisson Distribution; Gamma, Chi-Squared and Beta Distributions
10/31 - 11/04	3.4; 3.5; 3.6	Normal Distribution; Multivariate Normal Distribution; *t* and *F*-Distributions
11/07 - 11/11	3.7; Review; **Midterm-2**	Mixture Distributions
11/14 - 11/18	4.1; 4.2; 4.2	Expectations of Functions; Convergence in Probability
11/21 - 11/25	4.3; 4.3; Holiday	Convergence in Distribution
11/28 - 12/02	4.4; 4.4; Review	Central Limit Theorem
12/05 - 12/09	**Final Exam**	Final Exam

- # Handouts
  - Course Announcement
  - Mathematical Symbols
  - Derivatives, Integrals and Series
  - Power Series
  - Errata Sheet for Textbook
  - Table I: Poisson Distribution
  - Table III: Normal Distribution
- # Using R
  - Download **R** for Free -- the most popular software used by statisticians
  - Learn R in 15 Minutes
  - Use R to Compute Numerical Integrals
  - Downloadable Books on R:

- *An Introduction to R*, by William N. Venables, David M. Smith and the R Development Core Team
- *Using R for Data Analysis and Graphics - Introduction, Code and Commentary*, by John H. Maindonald
- *Practical Regression and ANOVA using R*, by Julian J. Faraway

More R Books in Different Languages ...

Relevant Course Materials

- Textbook Web Page -- including Errata page and R code
- Bruce K. Driver, *Math 280 Probability Lecture Notes*, 2009-2010 -- good for readers who want more relevant readings (thank Yan Xing for recommendation)
- Flip a Coin Online -- so many different kinds of coins, for §1.1
- Basic Mathematical Symbols -- symbols commonly used in mathematics
- Barber's Paradox -- a famous counterexample in the history of set theory, for §1.2
- Russell's Paradox -- another famous counterexample in the history of set theory, for §1.2
- Edwards' Venn Diagrams -- a nice construction to higher numbers of sets, for §1.2
- Cantor Function -- a mysterious function which grows considerably virtually without changing, for §1.5

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