Hunan University
MATH 33: Probability Theory

Professor: To be announced
Total contact hours: 54 hours
Credit: 4

Course Description

This course introduces students to a course in probability. The main topics include events, Set Theory, Sample Spaces, Conditional Probability, Functions of Random Variables and distributions and special distributions, Markov Chains, Expectation, Covariance and Correlation, Variance, Moments, the Law of Large Numbers, the Central Limit Theorem, tests, simulation and so forth.

Required Material

Probability and Statistics (Fourth Edition), DeGroot Morris H, Schervish Mark J, publisher: Pearson Education.

Reference book

Probability & Statistics for Engineers and Scientists, Sheldon Ross, Kindle eBook.
A Course In Probability Theory, 3rd edition, Kai Lai Chung, publisher: Elsevier Inc.

Grading

- Homework   10%
- Quizzes   20%
- Exercises(practices)   20%
- Midterm   20%
- Final Exam   30%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	

Course Schedule

The course has 24 class sessions in total. All sessions are 2 hours and 15 minutes in length.
Note: the course outline and required readings are subject to change.

Class 1:
Introduction to probability
Experiments and Events

Class 2:
Set Theory ; Sample Spaces
Combinatorial Methods
Conditional Probability

Class 3:
Multinomial Coefficients
Independent Events; Bayes' Theorem; Exercise 1

Class 4:
Random Variables
Continuous Distributions

Class 5:
Conditional Distributions
Multivariate Distributions

Class 6:
Functions of a Random Variable & Two or More Random Variables
Markov Chains; Exercise 2

Class 7:
The Expectation of a Random Variable
Properties of Expectations

Class 8:
Variance; Moments
The Mean and the Median; Quiz 1

Class 9:
Covariance and Correlation
Conditional Expectation

Class 10:
The Bernoulli and Binomial Distributions

The Hypergeometric Distributions

Class 11:
The Poisson Distributions
The Negative Binomial Distributions

Class 12:
The Normal Distributions
The Gamma Distributions; Exercise 3

Class 13:
The Beta Distributions
The Multinomial Distributions

Class 14:
The Bivariate Normal Distributions
Large random samples

Class 15:
The Law of Large Numbers
The Central Limit Theorem
Analysis on exercises

Class 16:
The Correction for Continuity
Statistical inference; Exercise 4

Class 17:
Distributions ; Estimators
Sampling distributions of estimators

Class 18:
Joint Distribution of the Sample Mean and Sample Variance
Bayesian Analysis of Samples from a Normal Distribution

Class 19:
Testing hypothesis; The t & F Test
Comparing the Means of Two Normal Distributions; Quiz 2

Class 20:
Bayes Test Procedures
Linear statistical models; Exercise 5

Class 21:

Statistical & Bayesian Inference in Simple Linear Regression
The General Linear Model and Multiple Regression

Class 22:
Analysis of Variance
Simulating Specific Distributions

Class 23:
Importance Sampling
Markov Chain Monte Carlo

Class 24:
The Bootstrap
Analysis on exercises and discussion

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

Policy on "Late Withdrawals"

In accordance with university policy, appeals for late withdrawal will be approved ONLY in case of medical emergency and similar crises.

Academic Honesty

Hunan University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:
— Attend all classes and be responsible for all materials covered in class and otherwise assigned;
— Complete the day's required reading and assignments before class;
— Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
— Participate in class discussions and complete required written work on time;
— Refrain from texting, phoning or engaging in computer activities unrelated to class during

the class period;

— While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.