

## Math 471 – Probability (3)

Probability spaces, random variables, distributions, expectations, moment-generating and characteristic functions, limit theorems. Continuous probability emphasized.

Pre: 244 (or concurrent) or 253A (or concurrent); recommended 305 or 371 or 372; or consent.

**Possible Texts:**

*A Course in Probability* by N. Weiss, Addison-Wesley

*Fundamentals of Probability* by S. Ghahramani, Prentice Hall.

Texts that can be used for both 471 and 472:

*Probability and Statistics* by M. DeGroot and M. Schervish, Addison-Wesley

*Mathematical Statistics* by Wackerly, Mendenhall and Scheaffer, Brooks/Cole.

Math 471 treats discrete and continuous probability jointly, with emphasis on the continuous case. Combinatorics should be deemphasized.

The following syllabus is based upon the text by Weiss.

A. Chapter 1-3 (three weeks)

Introduction to probability, brief treatment of set theory, sample spaces, axioms of probability, and basic properties of probability. Quick treatment of discrete probability, with very little combinatorics.

B. Chapter 4 (two weeks)

Conditional probability and independence.

C. Chapters 5-7 (three weeks)

Discrete random variables, joint distributions, expected value.

D. Chapters 8-10 (four weeks)

Continuous random variables, joint distributions, expected value.

E. Chapter 11 (two weeks)

Generating Functions and limit theorems.

**Course Objectives.** Upon successful completion, the student will have a foundation in the basic topics of the theory of Probability listed above in the syllabus. Emphasis on rigor will provide students the understanding needed for graduate work, and in the study of the logical foundations of mathematics.

**Program Objectives.** Math 471 is a senior level course in Probability, an important subject with many applications in Statistics, the physical and biological sciences, and Engineering. This course promotes our goal that our students learn, understand, and be able to apply several mathematical topics at the junior and senior level, and that our students acquire the ability and skills to apply mathematics to other fields.