

Math 7810-110: PROBABILITY II
Spring Semester, 2011

Time:	M W F 11:00–11:50am
Place:	228 Parker Hall
Instructor:	Dr. Erkan Nane
Office:	340 Parker Hall
Telephone:	844-6595
E-Mail:	nane@auburn.edu
Office Hours:	M W F 10:00–11:00am, and by appointment
Text:	<i>Probability: Theory and Examples</i> , Fourth Edition, by Rick Durrett
Prerequisite:	A full year of undergraduate mathematical analysis at a level commensurate with MATH 5200/5210.
Other references:	<i>Foundation of Modern Probability</i> , Second Edition, By Olav Kallenberg. <i>Introduction to Stochastic Process</i> , by Hoel, Port and Stone.

Course description:

This is the second semester of a two-semester graduate-level introduction to probability theory (Math 7800-7810) and it also serves as a stand-alone introduction to the subject.

Math 7800: Probability I: Fall 2010. Discrete-time probability and stochastic processes, including topics such as conditioning and independence, laws of large numbers, central limit theorem,

Math 7810: Probability II: Spring 2011. Central Limit Theorem in \mathbb{R}^d . Martingales. Continuous-time probability and stochastic processes, including topics such as continuous-time martingales and Markov processes, Brownian motion, stochastic integrals and differential equations, with relations to partial differential equations, stationary processes, ergodic theorems, Lévy processes, and large deviations.

Some applications of probabilistic techniques in other areas will be mentioned. The stochastic processes of various types have many applications in physics, finance, engineering and related areas. The course will be suitable for students who want to specialize in the area of probability. It will also be suitable for students from other areas of the sciences to broaden their view of mathematics. The course will cover many beautiful applications in physics, economics, particle systems, biological populations and mathematical finance. One of the most well known use of probability is solving partial differential equations and modeling stock market data. We will focus on these applications throughout the course.

As a prerequisite, strong background in undergraduate analysis is required at a level commensurate with MATH 5200/5210. In particular, the graduate analysis is not required, and the necessary background material will be developed as part of the course.

Homework: Bi-Weekly Homework (40%) will be regularly assigned. It is expected that students will do all the homework assigned. The due date will be announced in class.

Exams: There will be a midterm exam (25% each) on **March 4**.

Make-up exams will only be allowed in extreme circumstances.

Final exam: A **comprehensive** final (35%) will be given on Tuesday, May 3, 12:00 noon–2:30 pm.

Grading: The grading scale will be as follows:

80–100%	A
65–79%	B
55–64%	C
40–54%	D
39% or below	F

Math 7800 will cover:

- 1. Central limit theorems in \mathbb{R}^d
- 2. Radon-Nikodym theorem, Conditional expectation.
- 3. Martingales. Martingale convergence theorem, Doob's inequality, optional stopping theorem, applications.
- 4. Brownian motion and continuous martingales
- 5. Introduction to Stochastic integration

The instructor reserves the right to make any changes he deems academically advisable.

Important Dates for Spring Semester 2011

Jan. 10 Classes Begin (Mon)

Jan. 17 M. L. King Day (Holiday) (Mon)

Jan. 31 15th Class Day* (Mon)

Mar. 1 Mid Semester (36th Class Day)** (Wed)

Mar. 14-18 Spring Break (Mon-Fri)

Apr. 27 Classes End (Wed)

Apr. 28, 29 Study/Reading Day (Thu, Fri)

May 2-6 Final Exam Period (Mon-Fri)

May 9 Commencement (Mon)

* Last day to withdraw from a course with no grade assignment

** Last day to withdraw from a course with no grade penalty

Tips: This course is demanding and requires a great deal of work. Students are responsible for all material covered in class. Students are expected to attend each class period and to bring text. Read the textbook as assigned. Study the examples solved in class and in the textbook. Then do the homework problems. Try to study every day even if it has to be a few minutes only. It takes time and frequent practice to become comfortable with the material. Do not fall behind!

Policies: Academic Honesty (DISHONESTY): Suspicion of academic dishonesty and/or cheating will result in action by the University Honesty Committee. Refer to the Tiger Cub for more specific details. Student who plagiarize will receive a grade 0.0 on the assignment.

Special needs: To arrange for accommodation a student should contact the office of the Program with Disabilities, located in 1244 Haley center