Math 481 – Introduction to Stochastic Processes

Course Description from Bulletin: This is an introductory, undergraduate course in stochastic processes. Its purpose is to introduce students to a range of stochastic processes which are used as modeling tools in diverse fields of applications, especially in risk management applications for finance and insurance. The course covers basic classes of stochastic processes: Markov chains and martingales in discrete time, Brownian motion and Poisson process. It also presents some aspects of stochastic calculus. (3-0-3)

Enrollment: Elective for AM and other majors.

Textbook(s): Basic Stochastic Processes, by Z. Brzezniak and T. Zastawniak, Springer, 2000.

Other required material: None

Prerequisites: MATH 332 or 333 or equivalent; and MATH 475, or consent of the instructor

Objectives:

1. Students will understand the basic concepts underlying the theory and practice of finite Markov chains in discrete time.
2. Students will understand basic concepts underlying the theory and practice of martingales in discrete time.
3. Students will understand basic concepts underlying the theory and practice of stochastic processes in continuous time, illustrated with the two primary examples: Poisson process and Brownian motion.
4. Students will understand some aspects of the elementary stochastic calculus for Brownian motion.

Lecture schedule: 3 50 minutes (or 2 75 minutes) lectures per week

Course Outline:	Hours
1. Conditional expectations	6
2. Discrete time martingales	8
3. Discrete time Markov chains	8
4. Poisson process	8
5. Brownian motion	9
6. Elements of Ito stochastic calculus	6

Assessment:	Homework	0-30%
	Quizzes/Tests	20-50%
	Final Exam	30-50%

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