

## Probability Theory

INSTRUCTOR: Jinsoo Hwang  
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**Recommended Text:** Sheldon Ross, *A First Course in Probability*, 10th edition, Pearson. ISBN: 978-1-292-26920-7

**Prerequisite:** AMS 301 and AMS 310, or permission of instructor

**Topics to be Covered:** Sample spaces, axioms of probability, conditional probability and independence, discrete and continuous random variables, jointly distributed random variables, characteristics of random variables, law of large numbers and central limit theorem, Markov chains

**Homework:** Assignments will be given weekly. No late homework will be accepted. The lowest two homework scores will be dropped before computing the average.

**Homework Policy:** You may discuss problems with other students, but you must write up your homework completely on your own. Your writings must be independent: Do not look at another writeup. To do otherwise is a case of Academic Dishonesty and is subject to University policy.

### Tests

Exam I: Thursday, March 28, in class  
Exam II: Thursday, May 2, in class  
Final: Tuesday, June 11, 9:00 - 11:30 am, in C103

### Grading of Tests and Homework

Grading will be based on the following:

Homework (20%), Quizzes (10%), Midterms ( $2 \times 20\%$ ), Final (30%)

Trend in your progress will also be taken into account.

## **Learning Outcomes**

Upon successful completion of this course, students will be able to:

- calculate probabilities of events by working with sets that represent them.
- use the law of total probability and Bayes' rule to calculate probabilities of complex events.
- use random variables and their distributions to model the outcomes of random experiments.
- apply the general properties of the expectation and variance operators.
- calculate cumulative distributions, marginal distributions, conditional distributions, and moment generating functions.
- understand the basic convergence modes of random variables.
- explain and use the law of large numbers and the central limit theorem.

## **Academic Integrity**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

## **School Policy on Attendance**

1. If a student has over 20% unexcused absences, the student's final course grade will be an F.
2. Students should report the reason of absence to the professor in advance, or immediately after the absence.
3. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the professor.
4. The professor of the course reserves the right to excuse absences.
5. The professor may excuse the absence if the submitted documentation fulfills the following conditions: extreme emergencies, severe medical reasons with doctor's note, very important events

## **Critical Incident Management**

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

## **Course Evaluations**

Stony Brook University values student feedback in maintaining the high quality education it provides and is committed to the course evaluation process, which includes a mid-semester assessment as well as an end-of-the-semester assessment, giving students a chance to provide information and feedback to an instructor which allows for development and improvement of courses. Please click the the following link to access the course evaluation system: <http://stonybrook.campuslabs.com/courseeval/>

**Tentative Course Schedule: Based on the text by Ross**

Week	Dates	Chapter	Topic	Homework
1	2/27	Chapter 1	Combinatorial Analysis	
	2/29	Chapter 2	Axioms of Probability	#1, due 3/7
2	3/5	Chapter 2		
	3/7	Chapter 3	Conditional Probability & Independence	#2, due 3/14
3	3/12	Chapter 3		
	3/14	Chapter 4	Random Variables	#3, due 3/21
4	3/19, 3/21	Chapter 4		#4, due 4/4
5	3/26	Review		
	3/28	Exam I		
6	4/2, 4/4	Chapter 5	Continuous Random Variables	#5, due 4/11
7	4/9, 4/11	Chapter 5		#5, due 4/18
8	4/16, 4/18	Chapter 5		#6, due 4/25
9	4/23, 4/25	Chapter 6	Jointly Distributed Random Variables	#7, due 5/9
10	4/30	Review		
	5/2	Exam II		
11	5/7	Chapter 6		
	5/9	Chapter 7	Properties of Expectation	#8, due 5/23
12	5/14	No class		
	5/16	Chapter 7		
13	5/21, 5/23	Chapter 7		#9, due 5/30
14	5/28	Chapter 7		
	5/30	Chapter 8	Limit Theorems	# 10, due 6/4
15	6/4	Review		