

AMS 311 Probability and Statistics

INSTRUCTOR: Kyle Bradford
Assistant Professor, Department of Applied Math & Statistics, SUNY Korea
CLASS: Tuesday and Thursday 9:00PM-10:20PM, Room: TBD
OFFICE: Academic Building B525
OFFICE HOUR: Tuesday and Thursday 1:00PM - 3:00PM or by appointment
PHONE: 032-626-1911
E-MAIL: kyle.bradford@stonybrook.edu

Text: *A First Course in Probability* by Sheldon Ross, 9th edition, Pearson, ISBN: 978-0-321-79477-2

Chapters to be Covered: Chapters 1 through 8

Topics to be Covered: Combinatorial analysis; axioms of probability, conditional probability and independence; random variables; continuous random variables; jointly distributed random variables; properties of expectation; limit theorems

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

Tests

Exam I: Tuesday, April 3, in class
Exam II: Tuesday, May 8, in class
Final: Tuesday, June 18 3:15PM-5:45PM Room: TBD

Grading of Tests and Homework

Grading will be based on a 10 point standard and the following:

Homework (10%), Midterms ($30\% \times 2 = 60\%$), and Final exam (30%)

Any trend in your progress will also be taken into account.

Learning Outcomes

1. Demonstrate an understanding of core concepts of probability theory and their use in applications:
 - experiments, outcomes, sample spaces, events, and the role of set theory in probability;
 - the axioms of probability and the theorems and their consequences;
 - using counting principles to calculate probabilities of events in sample spaces of equally likely outcomes;
 - independence and disjointness;
 - conditional probability;
 - the law of total probability and Bayes' law;
 - the method of conditioning to solve problems;
 - Markov chains and associated conditioning arguments.
2. Demonstrate an understanding of the theory of random variables and their applications:
 - the difference between discrete random variables, continuous random variables, and random variables with hybrid distributions;
 - cumulative distribution functions and their properties;
 - probability mass functions for discrete random variables and computations to evaluate probabilities;
 - properties of commonly used discrete distributions, such as binomial, geometric, Poisson, and hypergeometric distributions;
 - probability density functions, computing them from cumulative distribution functions, and vice versa;
 - properties of commonly used density functions, such as uniform, exponential, gamma, beta, and normal densities;
 - means, variances, and higher moments of random variables, and their properties;
 - connections and differences between different distribution functions, e.g., normal approximation to binomial, Poisson approximation to binomial, and the difference between binomial and hypergeometric;
 - Markov and Chebyshev inequalities and utilizing them to give bounds and estimates of probabilities;
3. Demonstrate an understanding of the theory of jointly distributed random variables and their applications:
 - computations with joint distributions, both for discrete and continuous random variables;
 - computations with joint density functions and conditional density functions;
 - conditional expectation and conditioning arguments in computations involving two or more random variables;
 - computations with the bivariate normal distributions, the t-distribution, and chi-squared distributions, order statistics;

- applying indicator random variables to compute expectations;
- using moment generating functions in solving problems with sums of independent random variables;
- the weak and strong laws of large numbers;
- applying the central limit theorem in estimating probabilities.

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/>

Americans With Disabilities Act

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Academic Affairs. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

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/>

Attendance

1. All students of SUNY Korea are required to attend every class.
2. Unexcused absences will affect seriously the student's final grade in the course.
3. If a student has over 20% unexcused absence, the student's final course grade will be an F. In our case the 7th unexcused absence of a student will lead to an F grade of the course.
4. Students should report the reason of absence to the instructor in advance, or immediately after the absence.
5. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
6. The instructor of the course reserves the right to excuse absences.
7. The course instructor may excuse the absence if the submitted documentation fulfills the conditions below.

- Extreme emergencies (e.g. death in the family)
 - Severe medical reasons with doctor's note (Not a slight illness)
 - Very important events (e.g. national conference, official school event)
8. At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Tentative Course Schedule

Week	Dates	Chapter	Topic
1	2/27		Introduction
	3/01		No Class (Independence Movement Day)
2	3/06	1	Combinatorial Analysis
	3/08	2	Axioms of Probability
3	3/13	2	Axioms of Probability
	3/15	3	Conditional Probability & Independence
4	3/20	3	Conditional Probability & Independence
	3/22	4	Random Variables
5	3/27	4	Random Variables
	3/29		Review
6	4/03		Exam 1
	4/05	5	Continuous Random Variables
7	4/10	5	Continuous Random Variables
	4/12	5	Continuous Random Variables
8	4/17	6	Jointly Distributed Random Variables
	4/19	6	Jointly Distributed Random Variables
9	4/24	6	Jointly Distributed Random Variables
	4/26	6	Jointly Distributed Random Variables
10	5/01	6	Jointly Distributed Random Variables
	5/03		Review
11	5/08		Exam 2
	5/10	7	Properties of Expectation
12	5/15	7	Properties of Expectation
	5/17	7	Properties of Expectation
13	5/22		No Class (Buddha's Birthday)
	5/24	7	Properties of Expectation
14	5/29	8	Limit Theorems
	5/31	8	Limit Theorems
15	6/05	8	Limit Theorems
	6/07	8	Limit Theorems
15	6/12		Review