18.440 Probability and Random Variables Fall Semester, 2003

Class meetings: Monday, Wednesday, and Friday 2:00–3:00, in 4-163.

Text: Sheldon Ross, *A First Course in Probability*, sixth edition. You should try to read the text *before* class as well as after. Both your own understanding and your chance[1] of catching the lecturer in a *faux pas* will be greatly increased.

Lecturer: David Vogan, 2-281. Telephone: 253-4991. E-mail: dav@math.mit.edu. My office hours are Wednesday 3–4, Thursday 3–4, or by appointment.

Homework will be assigned in most classes. Problems assigned during each week will be collected at the beginning of the first class of the following week. You are free to consult your friends and any other sources while working on the problems, but you should write up your solutions entirely on your own. This is a place to show your understanding without time pressure.

Exams: There will be three exams during the lecture hour, on October 10, October 31, and November 24. There will be a three-hour final exam. The exams will all be closed book.

Grading: Each hour exam will be worth 100 points, the final exam will be worth 200 points, and the problem sets will be worth a total of 100 points.

Schedule

Wed 9/3	Lecture 1	1.1–1.3	Counting and permutations
Fri 9/5	Lecture 2	1.4–1.5	Multinomial coefficients
Mon 9/8	Lecture 3	2.1–2.2	Sample spaces, events, and set theory
Wed 9/10	Lecture 4	2.3–2.4	Axioms of probability
Fri 9/12	Lecture 5	2.5, 2.7	Equally likely outcomes
Mon 9/15	Lecture 6	3.1–3.2	Conditional probabilities
Wed 9/17	Lecture 7	3.3–3.5	Bayes' formula, independence
Fri 9/19	Lecture 8	4.1–4.2	Discrete random variables
Mon 9/22	Holiday		
Wed 9/24	Lecture 9	4.3–4.4	Expected value
Fri 9/25	Lecture 10	4.5	Variance
Mon 9/29	Lecture 11	4.6	Binomial random variables
Wed 10/1	Lecture 12	4.6	Binomial random variables continued
Fri 10/3	Lecture 13	4.7	Poisson random variables
Mon 10/6	Lecture 14	4.8–4.9	More discrete random variables
Wed 10/8	Lecture 15	1.1–4.9	review
Fri 10/10	Lecture 16		**Exam 1 on Chapters 1–4**
Mon 10/13	Holiday		
Wed 10/15	Lecture 17	5.1–5.2	Continuous random variables
Fri 10/17	Lecture 18	5.3	Uniform distribution
Mon 10/20	Lecture 19	5.5	Exponential random variables
Wed 10/22	Lecture 20	9.1	Poisson process
Fri 10/24	Lecture 21	5.4	Normal random variables
Mon 10/27	Lecture 22	5.6–5.7	More continuous random variables
Wed 10/29	Lecture 23	1.1–5.7	Review
Fri 10/31	Lecture 24		**Exam 2 on Chapters 1–5**

[1] See Lectures 4–6

Mon 11/3	Lecture 25	6.1	Joint distribution functions
Wed 11/5	Lecture 26	6.2	Independent random variables
Fri 11/7	Lecture 27	6.3–6.5	Sums of independent random variables
Mon 11/10	Holiday		
Wed 11/12	Lecture 28	7.1–7.2	Expectation of sums
Fri 11/14	Lecture 29	7.3	Covariance
Mon 11/17	Lecture 30	7.4	Conditional expectation
Wed 11/19	Lecture 31	7.6	Moment generating functions
Fri 11/21	Lecture 32	1.1–7.6	Review
Mon 11/24	Lecture 33		**Exam 3 on chapters 1–7.4**
Wed 11/26	Lecture 34	9.2	Markov chains
Fri 11/28	Holiday		
Mon 12/1	Lecture 35	8.1–8.2	Weak Law of Large Numbers
Wed 12/3	Lecture 36	8.3	Central Limit Theorem
Fri 12/5	Lecture 37	8.4–8.5	Strong Law of Large Numbers
Mon 12/8	Lecture 38	10.1–10.3	Simulating random variables
Wed 12/10	Lecture 39	S[2]	Review
week of 12/15–12/19			**Final Exam**

[2] See Lecture 3