

Probability and Statistics

Spring 2017



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Office Hours: Wednesday 10-12 or by appointment

Class Meetings: TR 11:10-12:30 (Harder 108)

Text: *Probability with applications and R* by Dobrow

Link to purchase (Amazon): <http://www.amazon.com/Probability-Applications-Robert-P-Dobrow/dp/1118241258>

Course Website: <https://github.com/statsbylopez/Probability>

Course Goals: Welcome to probability and statistics! Every moment in your day there is some element of uncertainty that you have to cope with. In statistics, we use concepts from probability to figure out the likelihood of events occurring. This can answer all kinds of questions, like whether or not a vaccine for HIV will work, if the Earth is really getting warmer, whether or not it is going to snow today, or whether the Patriots will win the Super Bowl. That in mind, the points of this course include:

- (1) Basic probability rules and axioms
- (2) Discrete and continuous probability distributions
- (3) Properties & moments of probability distributions
- (4) Applications in *R* statistical software

Computing: The use of the R statistical environment (downloadable from <http://www.r-project.org/>) with the RStudio interface (downloadable from www.rstudio.org) is thoroughly integrated into the course.

You will need to bring a scientific calculator to each exam. You will not be allowed to share a calculator with another student. You do not need a graphing calculator: any calculator that can take square roots, logs and exponents will suffice.

Grading:

Homework

Homework is the most effective way to reinforce concepts learned in class. There will be weekly homework assignments. Most often, questions will relate to material in the reading that will be covered in class. Doing probability is the best way to learn probability. You are welcome to collaborate with other students, but you must turn in your own work and write up all assignments in your own words.

Not all problems will need to be turned in. I will indicate with a * on the assignment page which problems should be turned in for grading.

Homework should be turned in at the beginning of class. Use smooth edged paper (not ripped from a notebook) and staple pages together. Write neatly and explain your work.

Credit will not be given for numerical solutions that appear without explanation.

On the top of every homework, write the names of *everyone* you collaborated with in doing problems. A basic principle of scholarship is that once gives credit to all who contributed to the findings. Copying and pasting sentences, paragraphs, or blocks of R code from another student is not acceptable and will receive no credit. All students, staff and faculty are bound by the Skidmore College Honor Code.

Late homework is not accepted. I will drop the lowest homework score.

Homeworks are graded out of 5 points:

- 1-3 out of 5 points: Most questions attempted, minimal effort
- 4 of 5 points: All questions attempted, complete effort, graded questions incorrect
- 4.5 of 5 points: All questions attempted, complete effort, graded questions partially correct
- 5 of 5 points: All questions attempted, graded questions perfect, proper presentation

Quizzes

There will be five quizzes given during the semester. These problems will be taken *exactly* from the homework problems.

Tests

There will be two exams to be taken during class time. All exams are closed book. You may bring a calculator and a cheat sheet to each exam: one 3 x 5 or 4 x 6 index card, both sides.

Participation

Active participation in class, engagement with the annotated readings notes, regular attendance, and completion of in-class labs will comprise the remainder of your grade.

Final

There will be a final exam held during the scheduled time. The final will be cumulative.

Grade allocation

Your course grade will be calculated using the maximum of the following two weighting schemes:

Participation:	5%
Homework	10%
Quizzes	10%
Midterms	25% each
Final	25%

OR

Participation:	5%
Homework	10%
Quizzes	10%
Midterms	10% (Lowest), 25% (Highest)
Final	40%

Extra Credit

Extra credit opportunities may arise over the course of the semester. Stay tuned.

Disability accommodations: Any student with special needs requiring accommodations should give me his/her memo of accommodations in a timely manner. It is the student's responsibility to follow up with me regarding all accommodations that require my participation. The student is advised to ensure full use of testing accommodations by coming to talk to me at least three days before any test.

Attendance: Your attendance in class is crucial, as is your punctuality. We are all going to learn this material together, so we need to have everyone present and working. Accommodations for an unavoidable absence can be made in advance via email; one necessary absence during the semester is not unusual; having more than two is uncommon.

Reading: I cannot stress the importance of reading the chapter text *before* coming to class. See the detailed syllabus for the sections you are responsible.

Title IX Statement: Skidmore College is committed to providing a learning, working, and living environment that reflects and promotes personal integrity, civility, and mutual respect. Members of the Skidmore community have the right to be free from all forms of abuse, assault, harassment, and coercive conduct, including sexual and gender-based misconduct, as defined in this policy. Skidmore College considers sexual and gender-based misconduct to be one of the most serious violations of the values and standards of the College. Unwelcome sexual contact of any form is a violation of students' personal integrity and their right to a safe environment and therefore violates Skidmore's values. Skidmore College will not tolerate sexual or gender-based misconduct in any form. Sexual and gender-based misconduct is also prohibited by federal regulations. In accordance with Title IX, Skidmore College does not discriminate on the basis of sex in any of its programs and activities.

Title IX Reporting Responsibilities: Skidmore College faculty are committed to supporting our students and upholding gender equity laws as outlined by Title IX. Therefore, if a student chooses to confide in a member of Skidmore's faculty or staff regarding an issue of sexual or gender-based misconduct, that faculty or staff member is obligated to tell Skidmore's Title IX Deputy Coordinator. The Title IX Deputy Coordinator will assist the student in connecting with all possible resources for support and reporting both on and off campus.

Additional policies:

Cell phones: If your phone rings, I get to answer it! Respect the rest of the class.

Computers: You may bring your own laptop to use for labs, or use the ones provided in Harder 108. I strongly recommend that computers be closed during note taking, and please be aware that your computer use is a distraction for your classmates. If you would like to use a computer during class, please sit in the back row.

Calendar (all subject to change except for test dates)

Date	Reading	Topics	Assignments Due
24-Jan	Ch. 1	Introduction, basics	
26-Jan		Equally likely outcomes, counting	HW 0
31-Jan	Ch. 2	Random variables, more basics	
2-Feb		Conditional Probability	HW 1
7-Feb		Law of Total probability, Birthday problem,	
9-Feb		Bayes, independence	HW 2
14-Feb	Ch. 3	Bernoulli, binomial distribution Quiz 1	
16-Feb		Binomial, Poisson distribution	HW 3
21-Feb	Ch. 4	No class, lab TBD	
23-Feb		Poisson, Expectation, functions of RV's	HW 4
28-Feb		Joint distribution, variance, covariance Quiz 2	
2-Mar		Review	HW 5
7-Mar		Test 1 (Chapters 1-4)	
9-Mar	Ch. 5	Discrete Topics	
21-Mar		Discrete Topics	
23-Mar	Ch. 6	Continuous Probability	HW 6
28-Mar		Continuous Probability, Quiz 3	
30-Mar		Geometric Probability	HW 7
4-Apr	Ch. 7	Normal distribution	
6-Apr		Continuous topics	HW 8
11-Apr	Ch. 8	Conditional distribution/density, Quiz 4	
13-Apr		Conditional expectation, conditioning	HW 9
18-Apr		Conditioning (con't)	
20-Apr		Test 2 (Chapters 5-8)	
25-Apr	Ch. 9	Inequalities, law of large numbers	
27-Apr		Central Limit Theorem	HW 10?
5-2		Additional topics, Quiz 5	
Final exam:		TBD	