

Course Policies and Syllabus

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Office Hours Thursday 11:30-12:30pm, or by appointment

Web page: <https://courses.soe.ucsc.edu/courses/ams131/Spring18/01>

Lectures: Tuesday, Thursday 9:50-11:25am, Baskin Auditorium 101

Texts: *Introduction to Probability*. CRC Press, J.K. Blitzstein and J. Hwang
Probability and Statistics. Fourth Edition. Addison Wesley., M.H. DeGroot and M.J. Schervish (2002).

Both books cover the course material. We will be following Blitzstein and Hwang more closely. If you plan on taking AMS 132, DeGroot and Schervish is used in that course as well.

Course Objectives: The course aims to provide an introduction to the basic ideas of probability, distribution theory and their applications. The main goal is to develop basic mathematical tools to consider models that incorporate uncertainty using a probabilistic framework.

Homework: There will be several (possibly weekly) homework assignments which will not be graded. Homeworks will give you an indication of the material that will be covered in exams and quizzes.

Sections: You are strongly encouraged to attend one of the sections offered. The TA will be there to work on problems that supplement the material covered in the lectures and will help you with the homework (or any other questions/concerns that you may have about the course material). Sections will be your primary resource for help with understanding the material.

Reading Material: Please keep in mind that the material in this course is cumulative. You really need to stay up to date by reading the relevant book chapters and by solving related homework problems.

Grading: There will be one in-class midterm (30% Thursday May 3rd), three quizzes (but only best two scores will be used in the grade calculation; 30%), and a final exam (40% Wednesday June 13th). Exams and quizzes will be based on the homeworks. The quizzes will be held in class. There will be no make-up for quizzes, your lowest score will be dropped to allow for any event (i.e., health problems, appointments with the doctor, etc.) that might prevent you from taking a particular quiz. Check the calendar for the dates of the quizzes. However, note that the dates may change.

Exam Accommodation: If you need DRC accommodation, or cannot make it to class on an exam day for a pre-approved reason such as an official UCSC sports team event, please make arrangements within the first two weeks of class.

Course Grade	Quizzes:	30%
	Midterm:	30%
	Final Exam:	40%

Tentative Schedule

AMS 131

Spring 2018

Note that *this schedule will almost certainly change.*

Date	DeG&S	B&H	Topics
Tu Apr 3	1.1-1.8	1.2, 1.3 1.6	Introduction; 3 views of probability; sample spaces; naive definition; counting; axioms of probability
Th 5			Review of math pre-requisites
Tu 10	1.7,1.10 2.1-2.3	1.4, 1.6 2.5, 2.1, 2.3	Birthday problem; properties of probability; inclusion-exclusion. matching problem; independence; conditional probability; Bayes' rule.
Th 12	2.1, 2.3 10.5	2.3, 2.7 2.8	Law of total probability; conditional probability examples; conditional independence; Monty Hall problem; Simpson's Paradox.
Tu 17	2.4, 3.1 3.3	2.7, 3.1, 3.3 3.4, 3.6, 3.2	Gambler's ruin; random variables; Bernouli; Binomial; Hypergeometric. CDFs; PMFs
Th 19	2.2, 5.5 4.1, 4.2	3.8, 4.3, 4.1 4.4, 4.2	Independence; Geometric distribution; expected values; indicator RVs linearity; Negative Binomial; examples Quiz
Tu 24	3.1, 3.2, 3.8 4.3, 5.4	4.7, 4.8, 5.1 4.6, 5.2, 5.3	Poisson distribution; Poisson approximation; discrete vs. continuous; PDFs; variance; standard deviation; Uniform distribution; universality
Th 26	5.6, 4.1	5.4, 4.5	Standard Normal Distribution; Normal normalizing constant. Normal distribution; standardization; Law of the unconscious statistician.
Tu May 1	3.4-3.5		Midterm Review
Th 3			Midterm
Tu 8	5.7, 4.4	5.5 6.1-6.4	Exponential distribution; memoryless property; MGFs; Bayes rule; Laplace's rule of succession
Th 10	4.4, 5.6 3.4-3.6	6.5, 6.6 7.1, 7.2	Use of MGFs; moments of Exponential and Normal; Sums of Poissons; joint, conditional and marginal distributions; 2-D LOTUS; examples
Tu 15	1.9, 4.1 4.6, 5.3	7.3, 7.4	Expected distance between Normals; Multinomial; Cauchy; covariance; correlation; variance of a sum; variance of Hypergeometric
Th 17	5.6, 5.8 3.8, 3.9	8, 8.2 8.3	Transformations; Log Normal; convolutions; Beta distribution; Bayes' Billiards. Quiz
Tu 22	5.7, 5.4 7.8, 4.7	5.6, 8.4 8.5, 8.6, 9	Gamma distribution; Poisson process; Beta-Gamma; order statistics; conditional expectation;
Th 24	4.7	9.1	conditional expectation (cont); waiting times
Tu 29	6.1-6.4	10, 10.2 10.3	Sum of random number of RVs; Inequalities; Law of large numbers; central limit theorem
Th 31	8.2, 8.4 5.10, 3.10	10.4, 7.5 11, 11.1, 11.3	Chi-squared; Student-t; multivariate normal Markov chains; transition matrix; stationary distribution Quiz
Tu Jun 5	3.10		Markov chains (cont).
Th 7			Review
Wed June 13			Final Exam, noon-3pm