

SYLLABUS

Introduction to Probability and Statistics for EE/CS

EE 364: Fall 2023 (4 units)

This course introduces the main concepts of modern probability and statistics. This course focuses on **reasoning** under *probabilistic uncertainty*. The course depends primarily on lecture material. Attendance is mandatory.

Instructor: Brandon Franzke
Email: franzke@usc.edu
Office: EEB 504B
Hours: Wednesday: 13:30 – 14:45
Thursday: 14:00 – 15:30

Lecture

Tuesday, Thursday (section: 30480)
12:00 – 13:50

Discussion

Friday (section: 30481)
11:00 – 11:50

Attendance and Participation

This class is offered with **in-person enrollment ONLY**. Attendance is mandatory to all lectures and discussions. You are responsible for missed announcements or changes to the course schedule or assignments. Taping or recording lectures or discussions is strictly forbidden.

TAs and staff

TA:	Wei Wang	Grader/CP:	TBA
Office:		Hours:	by appointment
Hours:	Monday: 10:15 - 11:30	E-mail:	
	Wednesday: 10:15 - 11:30		
Email:	wang890@usc.edu		

Piazza

<https://piazza.com/usc/fall2023/ee364tu>

Canvas (replaces blackboard)

<https://canvas.usc-ece.com>

Use Canvas to electronically submit your homework and view course grades. You will receive an email to register during the first week of classes. Contact Dr. Franzke with any technical issues.

Autolab

<https://autolab.usc-ece.com>

Use Autolab to electronically submit programming portions of homework for “auto-grading”. You will receive an email to register during the first weeks of the course. Contact Dr. Franzke with technical issues.

Course materials

- “*Probability, Statistics, and Random Processes for Electrical Engineering*”, 3rd edition. Alberto Leon-Garcia. Pearson. 2008. (ISBN: 0131471228).
- “*Probability and Statistical Inference*”, 10th edition. Robert Hogg, Elliot Tanis, and Dale Zimmerman. Pearson Education. 2019. (ISBN: 0135189399).
- “*Schaum’s Outline of Probability, Random Variables, and Random Processes*”, 4th edition. Hwei Hsu. McGraw-Hill Education. 2019. (ISBN: 1260453812), (available online, USC library).

Note: Texts are secondary to in-class lecture material and homework sets.

Course Outline (tentative)

	week of	
1	22 Aug	Introduction to probability. Modeling. Logic and set theory.
2	29 Aug	Independence. Conditional probability. Bayes formula.
3	05 Sep	Combinatorics. Binomial and multinomial probability.
4	12 Sep	Discrete probability and mass functions. Poisson Theorem.
	14 Sep	Quiz 1 (weeks 1-3), 12:00 - 12:50.
5	19 Sep	Continuous probability densities. Expectation, variance.
6	26 Sep	Laws of large numbers. Transformed densities.
7	03 Oct	Multiple random variables. Covariance and correlation.
8	10 Oct	Exam 1 (weeks 1-3), 12:00 - 13:20.
	12 Oct	No class: Fall recess.
9	17 Oct	Maximum likelihood estimation. Conditional expectation.
10	24 Oct	Bayesian statistics and conjugacy. Monte carlo sampling.
11	31 Oct	Transform methods. Sample mean and sample variance. Central limit theorem.
12	07 Nov	Confidence intervals. Statistical hypothesis tests. Bootstrap methods.
	09 Nov	Quiz 2 (weeks 9-11), 12:00 - 12:50.
13	14 Nov	Optimal estimators. Least squares and multivariable regression.
14	21 Nov	Logistic regression. Entropy and information.
	23 Nov	No class: Thanksgiving Break.
15	28 Nov	Probabilty structure of neural classifiers. Review.
	12 Dec	Final (Exam #2), 11:00 – 13:30.

Grading Procedure

Homework

Assigned weekly. This is an introductory course and homework is meant to supplement topics we cannot cover fully in class. Staying current with the class requires practice to master the concepts. Experience has shown that students who put in the effort on these homeworks, struggle with problems, and ask questions when they did not understand a problem did the best in this course.

Your total homework score sums your best homework scores (as a percentage) after removing the lowest two weekly assignments scores (of minimum 50%). Homeworks are due by the posted due date. Late homework will be accepted with a 10% deduction per 24-hours for up to 2 days. Homework will not be accepted after solutions are distributed. Solutions may be posted as soon as 2 days after the due date.

You may discuss homework problems with classmates but each student must do their own original work. Cheating warrants an F in the course. Turning in identical homework establishes a rebuttable presumption of cheating.

Checkpoint Quizzes

Checkpoint quizzes are short (50 minutes) non-cumulative assessments that cover the most recent material. Quizzes highlight important concepts and methods and test conceptual understanding of major principles. They occur approximately during week 4 and week 12. You may use one-side of one 3.5" × 5" reference card. You are expected to bring a scientific (non-graphing) calculator.

Exams

Exams are cumulative. You are expected to bring a non-graphing scientific calculator. You may use both-sides of one 3.5" × 5" reference card. You must show how you arrived at your answers to receive full credit.

Course Grade

Weekly HW (drop 2 \geq 50%)	20%	A	if 90 – 100 points
Computer HW	10%	B	if 80 – 89 points
Quizzes	20%	C	if 70 – 79 points
Exam #1	25%	D	if 60 – 69 points
Exam #2	25%	F	if 0 – 59 points

("+" and "-" within approx. 3% of grade boundary)

Cheating

Cheating is not tolerated on homework or exams. Penalty ranges from F on assignment or exam to F in course to recommended expulsion.

Academic Conduct

Plagiarism

Presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards <https://scampus.usc.edu/1100-behavior-violating-university-standards-andappropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>. Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu> or to the Department of Public Safety <http://capsnet.usc.edu/department/department-public-safety/online-forms/contactus>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/studentaffairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Academic Integrity

Academic integrity is critical the assessment and evaluation we perform which leads to your grade. In general, all work should be your own and any sources used should be cited. Gray-areas occur when working in groups. Telling someone how to do the problem or showing your solution is a VIOLATION. Reviewing examples from class or other sources to help a fellow classmate understand a principle is fine and encouraged. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code in Section 10, while the recommended sanctions are located in Appendix A. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs <http://sait.usc.edu/academicsupport/centerprograms/dsp/home.index.html> provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

Academic Accommodations

Any student requiring academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in GFS 120 and is open 08:30 – 17:00, Monday through Friday. The phone number for DSP is (213) 740-0776.