University of Southern California (USC)

Viterbi School of Engineering/Department of Industrial and Systems Engineering

ISE 220: Probability Concepts in Engineering

Section 31601, Fall 2019

Instructor: Hamid R. Chabok, Ph.D.
Office Address: GER 242
Email: chabok@usc.edu

Class schedule: Tue, Thu 9:30-10:50 am at KAP 148

Office hours: Tue, Thu 8:30-9 am
Other appointments must be scheduled in advance.

Teaching Assistant: Zhengyu Zhang
Email: zhan892@usc.edu

TA office hours: Wed 2:00pm - 4:00pm at OHE 340A

Prerequisites: MATH 126 Calculus II (MATH 226 recommended)

Required or Elective: This is a required lower division course.

Course Objectives/Outcomes

This is an introductory course to the fundamental concepts of probability (sample space, probability of events, conditional probabilities, random variables, expected values, variances, common random variables). No previous background of probability and statistics is required. This calculus-based course shows how to apply these concepts to industrial and systems engineering problems.

This course addresses the following student outcomes in criterion 3:

- **ABET a**: an ability to apply knowledge of mathematics, science, and engineering
- **ABET b:** an ability to design and conduct experiments, as well as to analyze interpret data
- **ABET e:** an ability to identify, formulate, and solve engineering problems
- **ABET k:** an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Required Course Materials

Textbooks:

1. Fundamentals of Probability With Stochastic Processes 4th Ed., S. Ghahramani, 2018, ISBN 9781498755092

2. Blackboard.usc.edu: ISE 220: Probability Concepts in Engineering, Course materials will be updated regularly.

Course Policies

1. Smartphones, tablets, laptops, apple-watch or anything which sends or receives information are strictly prohibited during quizzes and exams. You should bring your own calculator for the exams and quizzes if needed.
2. Participation in the discussions and asking about unclear subjects is extremely important and encouraged.
3. Students are responsible for all information given in class whether they are there or not. Students are expected to arrive at class on time and wait until the end of the lecture before packing up.
4. Homework will be due at the beginning of the stated class period. Late homework will not be accepted.
5. All classroom quizzes and exams are closed-book formats. Sometimes equations on small cheat-sheet maybe allowed. Reasonably neat work is expected on all materials submitted for grading.
6. The final exam must be taken in order to pass the class.

Assignments and Grading Criteria

The overall grade will be determined as follows:

Assignment	**Percentage**
Final Exam	40%
Midterm Exam	30%
Quizzes	20%
In-class Assignments and Homework	10%
Total:	**100%**

Grading Scale

Letter Grade	**Quality Grade**	**Percentage**	**Letter Grade**	**Quality Grade**	**Percentage**
A	4.0	≥ 93%	C	2.0	≥ 73%
A-	3.7	≥ 90%	C-	1.7	≥ 70%
B+	3.3	≥ 87%	D+	1.3	≥ 67%
B	3.0	≥ 83%	D	1.0	≥ 63%
B-	2.7	≥ 80%	D-	0.7	≥ 60%
C+	2.3	≥ 77%	F	0.0	< 60%

Course Communication

Interaction with Instructor

The Instructor will make every effort to communicate frequently with students through announcements and postings within the Blackboard site. Questions can be sent to the Instructor via email [chabok@usc.edu].

As a student, you should expect to receive assignment feedback and responses to postings within 48 hours. The Instructor will post an announcement alerting the students if he will be unavailable for more than a day.

Turnaround/Feedback

During the week (M-F) I will check Messages and emails several times a day. If you have a concern and send me an email message, you can expect a response within two days.

Course & University Policies

Students with Disabilities

Any Student requesting 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 (or to TA) as early in the semester as possible. DSP is located in STU 301and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, (213) 740 – 0776n
(Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX), ability@usc.edu

Academic Honesty/Student Conduct

Many incidents of plagiarism result from students' lack of understanding about what constitutes plagiarism. However, you are expected to familiarize yourself with USC's policy on plagiarism. All work you submit must be your own scholarly and creative efforts. At USC, plagiarism is defined as the act of using ideas, words, or work of another person or persons as if they were one's own, without giving proper credit to the original sources.

As a USC student, you must behave with honor and integrity at all times. The University in its quest for truth and knowledge embraces honesty and integrity. These fundamental values must not be compromised. The trust and respect among professors, students and the society need to be vigilantly protected. Cheating and plagiarism can be neither justified nor condoned as this would destroy the ideals and purposes of higher education. Students enter the University to gain the knowledge and tools necessary for participation in society. Academic integrity is one foundation for a society based on trust and honesty. Therefore, the University takes seriously its responsibility for academic honesty. For more information, refer to (www.usc.edu/dept/publications/SCAMPUS/

Tentative Course Outline/Schedule of Assignments

Week	Topic	Book chapter,	Activities/Assignments
1	Axioms of probability, Probability of equally likely events	Ch. 1	Thr: HW#1 Assigned
2	Combinatorial Methods	Ch. 2	Thr: HW#1 Due, Videos and solutions uploaded
3	Conditional probability, Law of total probability (LTP)	Ch. 3	Tue: Quiz #1 Thr: HW#2 Assigned
4	Independent events, Bayes rule, applications	Ch. 3	Thr: HW#2 Due, Videos and solutions uploaded
5	Random Variables, PMF, CDF of discrete random variables	Ch. 5	Tue: Quiz #2 Thr: HW#3 Assigned
6	Discrete Binomial, Geometric and Poisson random variables	Ch. 5	Thr: HW#3 Due, Videos and solutions uploaded
7	Expected Value and Variance	Ch. 5	Tue: Quiz #3
8	**Midterm Exam**, on Tuesday, Oct 15 at 9:30 am		
9	Continuous random variables, PDF, CDF, expectation, variance	Ch. 6	Thr: HW#4 Assigned
10	Uniform, Normal, Exponential and Gamma variables	Ch. 7	Thr: HW#4 Due, Videos and solutions uploaded
11	Jointly distributed (multivariate) random variables	Ch. 9	Tue: Quiz #4 Thr: HW#5 Assigned
12	Marginal and conditional distributions	Ch. 9	Thr: HW#5 Due, Videos and solutions uploaded
13	Covariance, independence and sums of random variables	Ch. 10	Tue: Quiz #5 Thr: HW#6 Assigned
14	Central limit theorem (CLT), Normal approximation to Binomial	Ch. 11	Thr: HW#6 Due, Videos and solutions uploaded
15	Comprehensive Review	Ch. 11 and Review	Tue: Quiz #6
16	**Final Exam**, on Thursday, Dec 12, from 11 am to 1 pm.		