University of Southern California (USC)

Viterbi School of Engineering/Department of Industrial and Systems Engineering

ISE 220: Probability Concepts in Engineering

Section 31601, Spring 2020

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

Class schedule: Tue, Thu 11:00-12:20 pm at SSL 202

Office hours: Tue, Thu 10:30-11:00 am at GER 242-A

Teaching Assistant (TA): Yuanxiang Wang
Email: yuanxian@usc.edu
TA office hours: Wed 2:00pm - 4:00pm at GER 242-A

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.

ABET Student Outcomes are required skills and knowledge that students must attain by graduation. **This course addresses the following student outcomes:**

- **ABET a**: an ability to apply knowledge of mathematics, science, and engineering

This outcome is assessed via a midterm exam.

Required Course Materials

1. **Textbook:** Fundamentals of Probability With Stochastic Processes 4th Ed., S. Ghahramani, 2018, ISBN 9781498755092. 3rd edition is also fine.
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 all quizzes and exams. You should bring your own calculator for the exams and quizzes.
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/

[1]Tentative Course Outline/Schedule of Assignments

Week	Topic	Book chapter,	Activities/Assignments
1	Probability concept (sample space and event), Axioms of probability	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	Distribution Functions (CDF), Discrete random variables	Ch. 4	Tue: Quiz #2 Thr: HW#3 Assigned
6	Expectations of Discrete Random Variables, probability mass function (PMF), and Variances	Ch. 4	Thr: HW#3 Due, Videos and solutions uploaded
7	Discrete Random Variables: Binomial, Review for Midterm exam	Ch. 5	Tue: Quiz #3 - Due Thr: Quiz#4 (Take home) Assigned
8	Poisson and Hypergeometric Random Variables	Ch. 5	Thr: Quiz#4 (Take home) Due, Videos/solutions uploaded, Review
9	**Midterm Exam**, on *Tuesday, Mar 10 at 11:00 am*		
10	Continuous random variables: PDF, Density function Expectation, and Variance	Ch. 6	
11	Uniform, Normal, Exponential, Gamma and Weibull Variables	Ch. 7	Thr: HW#4 Assigned
12	Transformation of random variables, Joint (Multivariate) Distributions	Ch.8, Ch. 9	Thr: HW#4 Due, Videos and solutions uploaded
13	Marginal and conditional distributions	Ch. 9	Tue: Quiz #5 Thr: HW#5 Assigned
14	Sums of Random Variables, Correlation	Ch. 10	Thr: HW#5 Due, Videos and solutions uploaded
15	Limit Theorems, Comprehensive Review	Ch. 11, Review	Thr: Quiz #6 (Take home) Due
16	[2]**Final Exam**, on *Tuesday, May 12, from 11 am to 1 pm*		

[1] Schedule may be revised to accommodate the content and pace of the class learning process. Due dates, quizzes, and homework subject to change.

[2] Confirm the time and date of the exam on USC website.

[3]Final Examination Policy

Student Scheduling Conflicts

No student is permitted to omit or take early a final examination and no instructor is authorized to permit a student to do so.

Students should plan in advance to avoid scheduling conflicts in their final examinations. If a student is scheduled for two final examinations at the same time, the student should request to take one of the examinations on a different day or time. If a student is scheduled for more than two final examinations in one day, the student may request to take one of the exams on a different day or time. In either situation the student must contact the professors involved no later than two weeks prior to the scheduled examination date and request an accommodation. If an accommodation cannot be arranged, the student should contact USC Testing Services at testing@usc.edu or (213) 740-7166 for assistance.
Faculty are reminded that grades are due 96 hours after the university-scheduled final examination day and time. Therefore, it might not be possible to accommodate late student requests for an alternate, makeup final examination after the published examination period.

Religious Observance Conflicts

When a final examination is scheduled at a time that conflicts with a student's observance of a holy day, faculty members should accommodate a request for an alternate examination date and time. A student must discuss a final examination conflict with the professor no later than two weeks prior to the scheduled examination date to arrange an acceptable alternate examination date and time.

The student and/or professor may reach out to the Office of Religious Life (213-740-6110 or vasoni@usc.edu, Dean of Religious Life) for guidance.

Documented Emergencies

In the case of a documented emergency that occurs after the withdrawal date and/or during the final exam period, students should consult the professor about receiving a grade of Incomplete (IN) for the semester. Faculty and students alike should refer to the rules regarding the mark of Incomplete at the time of the request.

The Registrar's recommended definition of emergency:

"An unforeseeable situation or event beyond the student's control that prevents her from taking the final examination or final summative experience." Based on this definition, a student may not request an IN before the withdrawal deadline. The rationale is that the student has the option to drop the course until the withdrawal date. The grade of IN exists so there is a remedy for illness or emergency, which occurs after the deadline to withdraw.

[3]From USC website