

University of Southern California (USC)

Viterbi School of Engineering/Department of Industrial and Systems Engineering

ISE 220: Probability Concepts in Engineering

Sections 31557, 31601, Fall 2020

Instructor: Hamid R. Chabok, Ph.D.

Office Address: Online on Zoom

Email: chabok@usc.edu

Class schedule: **Online on Zoom** Twice a week on Tuesday/Thursday 9:30-10:50 am (All class sessions as well as quizzes and exams (Midterm and Final exams) will be held Online on Zoom.

[Virtual] Office hours: Twice a week on Tuesday/Thursday 11:00 -11:30 AM Online on Zoom
Other appointments should be scheduled in advance.

Teaching Assistant (TA): Brian Plotnik

Email: bplotnik@usc.edu

TA office hours: Wednesday 10:00 – 11:00 AM online on Zoom

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.

Course Structure

This course is to be conducted entirely online. You will participate in the course using USC [Blackboard \(Bb\)](#) system.

Required Course Materials

1. **Textbook:** Fundamentals of Probability With Stochastic Processes 4th Ed., S. Ghahramani, 2018, ISBN 9781498755092. Older (3rd) edition is also fine.
2. Blackboard.usc.edu: ISE 220: Probability Concepts in Engineering, Course materials will be updated regularly.

Computer Requirements

1. Reliable access to a high-speed Internet connection (DSL, cable, on-campus wifi, etc).
2. Access to a webcam and microphone for participation in online meetings, and exams.

Course Policies

1. Participation in the class discussions and asking about unclear subjects is extremely important and encouraged.
2. Course Material is maintained through Canvas. Students are responsible for all information given in class whether they are there or not. Students are expected to attend the online-class on time.
3. The final exam must be taken in order to pass the class. Students webcams must stay on during final exam.
4. Reasonably neat work is expected on all materials submitted for grading.

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 301 and 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/

¹Tentative Course Outline/Schedule of Assignments

Week, date	Topic	Readings, Assignments, Deadlines:
1 8/18, 8/20	Ch. 1: Probability concept (sample space and event), Axioms of probability	Expected Readings: Syllabus, course outline Assignments Due: two surveys Prepare for topic: Ch.1 and Ch. 2 HW#1 assigned on Thursday
2 8/25, 8/27	Ch. 2: Combinatorial Methods	<ul style="list-style-type: none"> • Expected Readings: Ch. 1 • Assignments Due: Syllabus quiz on Tuesday; HW#1 on Thursday • Prepare for topic: Ch. 2 and Ch. 3-1 • Videos and solutions will be uploaded
3 9/1, 9/3	Ch. 3-1: Conditional probability, Law of total probability (LTP)	<ul style="list-style-type: none"> • Expected Readings: Ch. 2 • Assignments Due: Quiz #1 on Tuesday • Prepare for Topic: Ch. 3-1 and Ch 3-2 • HW#2 assigned on Thursday
4 9/8, 9/10	Ch. 3-2: Independent events, Bayes rule, applications	<ul style="list-style-type: none"> • Expected Readings: Ch. 3-1 • Assignments Due: HW#2 due on Thursday • Prepare for Topic: Ch. 3-2 and Ch. 4 • Videos and HW solutions will be uploaded
5 9/15, 9/17	Ch. 4: Distribution Functions (CDF), Discrete random variables	<ul style="list-style-type: none"> • Expected Readings: Ch. 3-2 • Assignments Due: Quiz #2 on Tuesday • Prepare for Topic: Ch. 4 and Ch. 5 • HW#3 assigned on Thursday
6 9/22, 9/24	Chs. 4, 5: Expectations of Discrete Random Variables, PMF, and Variances. Discrete Random Variables: Binomial.	<ul style="list-style-type: none"> • Expected Readings: Ch.4 • Assignments Due: HW#3 due on Thursday • Prepare for Topic: Ch. 5 • Videos and solutions will be uploaded
7 9/29, 10/1	Ch.5: Poisson and Hypergeometric Random Variables, Midterm Review	<ul style="list-style-type: none"> • Expected Readings: Ch. 4 and Ch. 5 • Assignments Due: Quiz #3 on Tuesday • Prepare for Topic: Review for Midterm • Videos and Quiz#3 solutions will be uploaded
8 10/6, 10/8	Midterm Exam, on <i>Tuesday, Oct 06 at 9:30 am</i> Thr: Ch.6: Continuous random variables	<ul style="list-style-type: none"> • Expected Readings: Up to Ch. 5 • Assignments Due: none • Prepare for Topic: Ch. 6
9 10/13, 10/15	Ch. 6: Continuous random variables: PDF, Density function, Expectations, and Variances	<ul style="list-style-type: none"> • Expected Readings: Ch. 6 • Assignments Due: none • Prepare for Topic: Ch. 7 • HW#4 assigned on Thursday

Week, date	Topic	Readings, Assignments, Deadlines:
10 10/20, 10/22	Ch. 7: Uniform, Normal, Exponential, and Gamma Variables	<ul style="list-style-type: none"> Expected Readings: Ch. 6 Assignments Due: HW#4 due on Thursday Prepare for Topic: Ch. 7, Ch. 8, and Ch. 9 Videos and solutions will be uploaded
11 10/27, 10/29	Chs. 8, 9: Transformation of random variables, Joint (Multivariate) Distributions	<ul style="list-style-type: none"> Expected Readings: Ch. 7 Assignments Due: Quiz #4 on Tuesday Prepare for Topic: Ch. 8, Ch. 9, and Ch. 10 HW#5 assigned on Thursday
12 11/3, 11/5	Chs. 9, 10: Marginal and conditional distributions, Sums of Random Variables, Covariance	<ul style="list-style-type: none"> Expected Readings: Ch. 8 and Ch.9 Assignments Due: HW#5 due on Thursday Prepare for Topic: Review Chs. 6-10 HW#5 solution and Quiz #5 questions will be uploaded
13 11/10, 11/12	Comprehensive Review (Chs. 6-10)	<ul style="list-style-type: none"> Expected Readings: Chs. 6-10 Assignments Due: Quiz #5 (Take home) due on Thursday Prepare for Topic: Review for Final Exam Videos and Quiz#5 solutions be uploaded
14 11/19	² Final Exam , on <u>Thursday November 19, 8-10 a.m.</u>	<ul style="list-style-type: none"> Expected Readings: prepare for Final exam Assignments Due: none

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 final exam on USC website.

Calendar of Assignments & Dates

Due Date	Assignment	Points (from 100)
08/27	HW #1	1 points
09/01	Quiz #1	4 points
09/10	HW #2	1 points
09/15	Quiz #2	4 points
09/24	HW #3	1 points
09/29	Quiz #3	4 points

Due Date	Assignment	Points (from 100)
10/06	Midterm Exam	30 points
10/22	HW #4	1 points
10/27	Quiz #4	4 points
11/5	HW #5	1 points
11/12	Quiz #5	4 points
11/19	Final Exam	40 points

³Final 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.

³From USC website