Syllabus ISE-500

Statistics for Engineering Managers

Fall 2024

Units: 4
Day: Tues/Thu 2:00 P.M.-3:50 P.M.
Location: RTH 105 (DEN@Viterbi for DEN Students)

Instructor:	Niloufar Izadinia
Email:	izadinia@usc.edu
Website:	https://viterbi.usc.edu/directory/faculty/Izadinia/Niloufar
Office Hours:	Tuesdays, Noon – 12:45 PM, GER 202 Thursdays, 6 PM -6:45 PM on Zoom
Teaching Assistant:	TBD
Email:	TBD
Office Hours:	TBD

Course Description: An introduction to statistics and its relevance to decision making including the following topics: Framing engineering management situations with statistical methods, probability, experiments, distributions, regression, ANOVA, hypothesis testing and confidence intervals, and statistical process control and sampling. Excel and R (R is optional) will be used to demonstrate and solve problems.

Prerequisites: None

Learning Objectives:

- Use Excel (R is optional) to solve statistical problems
- Understand the basics of decision making
- Demonstrate an understanding of statistical analysis in managerial decisions
- Illustrate mastery of statistical tools in decision making
- Interpret the outcome and meaning of statistical information
- Identify the limitations of the use of statistical methods
- Apply statistical tools in contemporary management

Recommended Texts:

Jay L. Devore "Probability and Statistics for Engineering and the Sciences ", 8th Edition, Brooks/Cole, 2009, ISBN-13:978-0-538-73352-6

References:

Sheldon M. Ross "Probability and Statistics for Engineers and Scientists", 4th Editions, Academic Press, 2009, ISBN 13:978-0-12-370483-2

Roger B. Myerson "Probability Models for Economic Decisions" , Thomson Brooks/Cole, 2005 ISBN 0-534-42381-7

Raiffa, Richardson and Metcalfe "Negotiation Analysis", by, Harvard University Press, 2002 ISBN 0 – 674 – 008890 –1

Robert L. Winkler "An Introduction to Bayesian Inference and Decision", 2nd Edition, Probabilistic Publishing, 2003

John K Kruschke "Doing Bayesian Data Analysis", Academic Press, 2011

Schmuller, Joseph "Statistical Analysis with R for Dummies", John Wiley and Sons, 2017, ISBN-978-1-119-33706-5

Grading Policy:

Homework	25%
Participation	15%
Quizzes	10%
Midterm 1	15%
Midterm 2	15%
Final exam	20%

Homework Assignments:

- Assignments are assigned on the second period of the week and **are due at midnight of Friday of the week of the following week**, submitted through the assignment manager on D2L and will be returned electronically. Solutions will be posted after the assignment is due. It is imperative that you prepare for class. You will find it difficult to follow the discussion if you have not read the material.

- **Late homework submissions are not accepted under any circumstances**. However, **two lowest scores will be dropped (a missed homework is a zero).**

- It's OK to work on individual homework assignments together but finish it by yourself and indicate whom you worked with. Each student must turn in a separate homework. Do not give your files to others, and do not use others' files. Do not copy solutions from people you have worked with or from anyone else. Generated data and essay questions must be unique to each student. If you use solutions from prior semesters, indicate that. **If the answer is given in a book, don't just copy it, explain how you got it.**

- The assignments should be as professional in appearance as if you were preparing reports at work or for publication.

Participation:

General:
This is intended to be an interactive class and your participation should increase as the semester progresses. Students are expected to have read the preparation material and participate actively in the discussions and exercises in the class. You should be prepared to devote the time necessary to take the course. The course material is cumulative, and you need to keep up as we go along.

In-class exercises and challenges:
There will be several in-class exercises and challenges that you should do during the class time.
Laptops, desktops, or iPads are required to do and submit these exercises. **The students can either do them individually or in teams of at most three**.

If you are a **DEN Student** and you do attend asynchronously, you should still submit the in-class exercises **no later than 72 hours after the class** to get the full credit.

For on-campus students:
Attending **all** classes for the **whole** duration of class is expected of everyone. Frequent absences will result in a reduction in grade. Punctuality is expected.

For DEN students:
You should attend synchronously if the class time falls between 7 A.M. and 10 P.M. in your time zone. You may be excused from watching synchronously for a valid reason, obtained before second week of classes (send the instructor an email about that). If you do attend asynchronously, you should **watch the lecture video no later than 72 hours** after the session. Your activity will be recorded automatically via DEN website, so **there is no need** to send the instructor an email after having watched every time. Frequent absences/unwatched videos will result in a reduction in grade.

Quizzes:

- There will be a take home quiz in the indicated weeks **assigned after the second class in the week** and **due online prior to the first class of the next week**.
- The purpose of these quizzes is to encourage you to keep up with the class material. I anticipate that you will have little difficulty in answering the questions if you are up to date on the class materials.
- The quiz each week will be based primarily upon the material from the same week. The quizzes are open notes, book and laptop and are to be submitted to D2L when due.
- Some of the quizzes may be in class -rather than take home (except for distance students who are to follow the rules used by DEN). However, the instructor will let you know the week before if there will be an in-class quiz the following week.
- There are **no make-up quizzes**. However, **two lowest scores will be dropped (a missed quiz is a zero).**

Examinations:

- The midterms and final will be based on homework assignments, quizzes, and the discussions, notes and in-class exercises. Students are expected to apply what they should have learned up to that point to analyzing situations, identifying the problems, and applying the appropriate techniques to solve them or interpreting computer solutions.
- The midterms and final exams are **closed book and close notes** and **take home**.
- Calculators are OK but laptops or desktops are required[1].
- Students can use a **two-sided letter size handwritten cheat sheet** for midterm 1. Two of such cheat sheets for midterm 2, and three for final exam.
- Exam problems will be true/false, fill in the blank, and multiple choice and are to be done on D2L.
- The students will have until the midnight of the next day of the exam to take the exam on D2L.
- Note that the exams are timed (2 hours approximately) and the students have only one attempt to complete the exam.
- **There will be no class on the exam days.**

[1] https://itservices.usc.edu/spaces/laptoploaner/

Test Schedule:

	Start	Due
Midterm 1	Thursday, September 26, 2024, 2 pm	Friday, September 27 at midnight
Midterm 2	Thursday, November 7, 2024, 2 pm	Friday, November 8 at midnight
Final	Thursday, December 12, 2024, 2 pm	Friday, December 13 at midnight

Course Outline:

Week	Topics	Reading	Assignments due
Week 1	Introduction and overview, Why Statistics? , Probability	Devore Chapters 2	-
Week 2	Discrete Distributions	Devore Chapters 3	HW1(Intro to prob.)
Week 3	Continuous Distributions	Devore Chapter 4	
Week 4	Limits and convergence Data structure and visualization	Devore Chapters 1, 5	HW2 (rand vars)
Week 5	**Review session - Midterm 1 (ch. 2,3,4)**		-
Week 6	Fitting a probability distribution	Devore Chapters 6, 7	HW3(limits-Vis)
Week 7	Fitting a probability distribution - Confidence Intervals (I) – **No class on Thursday (Fall Recess)**	Devore Chapters 7, 9	
Week 8	Confidence Intervals (II)	Devore Chapters 7, 9	HW4(fit Dist)
Week 9	Confidence Intervals (III)- Hypothesis testing (I) – **No class on Tuesday (INFORMS Annual Meeting)**	Devore Chapter 8, 9	
Week 10	Hypothesis testing (II)	Devore Chapter 8	HW5 (CI)
Week 11	**Review session - Midterm 2 (ch. 1,5,6,7,9)**		-
Week 12	Covariance and correlation - ANOVA	Devore Chapters 10, 11	HW6 (Hyp)
Week 13	Linear regression (I)	Devore Chapter 12	HW7 (corr,cov)
Week 14	Linear regression (II)- Quality Control Methods – **No class on Thursday (Thanksgiving)**	Devore Chapter 13, 16	HW8 (reg,anova)
Week 15	Discrete and Continuous Bayesian Analysis (Winkler) / Decision Making (Material provided from Raiffa) *time permitting. **Review session**	Winkler Chapters 3, 4/ Raiffa, chapters 1, 2, 3	HW9 (QC)

Important Notes:

- The syllabus may get updated during the semester.
- In all your emails to the instructor, copy the TA as well to make sure you get the response as soon as possible.
- **Include "ISE 500"** at the beginning of all your email titles to get the response as soon as possible.
- **ALWAYS BE SURE TO GIVE THE SOURCE OF ALL YOUR INFORMATION. ANYTHING TAKEN VERBATIM FROM SOMEONE ELSE MUST BE IN QUOTATION MARKS AND REFERENCED. THIS INCLUDES PARTIAL SENTENCES.**
- Grading Scale Course final grades will be determined using the following scale

A	[94, 100]	C	[74, 77)
A-	[90, 94)	C-	[70, 74)
B+	[87, 90)	D+	[67, 70)
B	[84, 87)	D	[64, 67)
B-	[80, 84)	D-	[60, 64)
C+	[77, 80)	F	< 60

Statement on Academic Conduct and Support Systems

Academic Integrity:
The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.