

# Statistics for Engineering Managers

## ISE 500 (4 Units)

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Spring 2024

### Description

Framing engineering management situations with statistical methods. Experiments, distributions, regression, ANOVA, hypothesis.

### Objective

The primary goal of this course is to ensure you grasp, interpret, and validate statistical analysis outcomes, enabling informed decision-making. Additionally, it aims to equip you with the knowledge of selecting suitable statistical techniques when faced with specific situations or issues. This course is designed to prepare prospective engineering managers in utilizing prevalent statistical methods for decision-making amidst uncertainty. It covers analyzing data to derive decision-relevant information and establishing a framework for assessing decisions when dealing with incomplete information.

### Prerequisites

None.

### Instructor

Ragheb Raad, [raghebra@usc.edu](mailto:raghebra@usc.edu)

### Course

Pranjal Sharma, [pranjals@usc.edu](mailto:pranjals@usc.edu)

### Producers/TAs

### Office Hours

TBA

### Lecture / Lab

TTH 4pm to 5:50pm

### Textbook

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

## Course Structure

Topics covered during lecture will be applied to about 5 homework assignments spread throughout the semester. All homework assignments must be completed *individually* and outside of regularly scheduled class meetings.

## Grading

The following percentage breakdown will be used in determining the grade for the course.

Homework assignments	20%
Networking Assignments	5%
Participation	10%
Midterm exam	30%
Final exam	35%
<b>Total</b>	<b>100%</b>

## Grading Scale

The following shows the tentative grading scale to be used to determine the letter grade.

93% and above	A
90% - 92%	A-
87% - 89%	B+
83% - 86%	B
80% - 82%	B-
77% - 79%	C+
73% - 76%	C
70% - 72%	C-
67% - 69%	D+
64% - 66%	D
63% and below	F

The instructor reserves the right to change grading percentages and scale them the way they deem fit/necessary.

## **Policies (continued)**

### **Homework assignments**

Each homework assignment must be completely *individually*. There are no group projects in this class.

Each homework assignment will include instructions, a due date, and can be found on the Blackboard site for this course.

It is your responsibility to submit your all homework assignments on or before the due date. Homework assignments turned in one day late will have 20% of the total points deducted from the graded score. Homework assignments turned in two days late will have 50% of the total points deducted from the graded score. After two days, submissions will not be accepted, and you will receive a 0.

### **Participation**

When students enroll in this course, they are expected to actively participate in class discussions and make a commitment to attend regularly. Simply attending class is not enough; students are encouraged to contribute to the learning environment by asking relevant questions and engaging in discussions. While attendance policies do not provide rewards for attending class, they may impose penalties for non-attendance. Being late or missing class due to working on assignments is not an acceptable excuse. Students must arrive on time and fully prepared to participate in each class meeting. While there may be legitimate reasons for a student to miss class, excessive absences can hinder their ability to fulfill the requirements of the course. In such cases, the instructor may recommend that the student withdraw from the course, not as a punishment for missing class, but as an acknowledgment that the student may not be able to complete the course assignments due to their frequent absences.

**Note:** The instructor might ask the students to watch a video or read an article as a preparation for a certain class. While such an assignment will not be graded, not proceeding with it will lead to your inability to participate in the class discussion associated with it.

### **Two Networking assignments:**

Networking is a very important part of being a professional. The best place to network and meet other professionals is the classroom itself. Unfortunately, many students take classes where they barely – or even do not – meet anyone. These assignments will help you combat such an inconvenience. Throughout the semester, each student will be required to participate in two networking meetings with their classmates (groups of 5 to 10). Each group will agree unanimously on a time and place where they will be meeting and just socializing. The duration should be at least one hour. A group picture must be taken. Each student will therefore send the group picture as evidence, and they will mention who was in the meeting and what did they do. More details on the deadlines and specificities will be mentioned in class. Groups have to be different for each of the two assignments.

## **Exams**

Make-ups are only allowed under extraordinary circumstances. Students must provide a satisfactory reason (as determined by the instructor) along with proper documentation. There are two exams: a midterm and a final. These exams are comprehensive of all topics covered.

## **Course material policy**

Do not reproduce, distribute, or post any assignment solutions or exams publicly without written consent of the instructor, as this will be considered an academic integrity violation.

## **Incomplete and Missing Grades**

Excerpts for this section have been taken from the University Grading Handbook, located at <http://www.usc.edu/dept/ARR/grades/gradinghandbook/index.html>. Please see the link for more details on this and any other grading concerns.

A grade of Missing Grade (MG) “should only be assigned in unique or unusual situations... for those cases in which a student does not complete work for the course before the semester ends. All missing grades must be resolved by the instructor through the Correction of Grade Process. One calendar year is allowed to resolve a MG. If an MG is not resolved [within] one year the grade is changed to [Unofficial Withdrawal] UW and will be calculated into the grade point average a zero grade points.”

A grade of Incomplete (IN) “is assigned when work is no completed because of documented illness or other ‘emergency’ **occurring after the twelfth week** of the semester (or 12<sup>th</sup> week equivalency for any course scheduled for less than 15 weeks).”

## **Academic Conduct and Support Systems**

### **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-and-appropriate-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/contact-us>.

This is important for the safety 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/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage [sarc@usc.edu](mailto:sarc@usc.edu) describes reporting options and other resources.

## **Academic Conduct and Support Systems (continued)**

### **Academic Conduct:**

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### **Support Systems:**

*Student Counseling Services (SCS)* - [\(213\) 740-7711](tel:(213)740-7711) – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

*National Suicide Prevention Lifeline* - [1-800-273-8255](tel:1-800-273-8255)

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

*Relationship & Sexual Violence Prevention Services (RSVP)* - [\(213\) 740-4900](tel:(213)740-4900) - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

*Office of Equity and Diversity (OED)/Title IX compliance* – [\(213\) 740-5086](tel:(213)740-5086)

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

*Student Support & Advocacy* – [\(213\) 821-4710](tel:(213)821-4710)

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic.

<https://studentaffairs.usc.edu/ssa/>

*Diversity at USC* – <https://diversity.usc.edu/>

Tab for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students

## **Academic Conduct and Support Systems (continued)**

All submissions will be compared with current, previous, and future students' submissions using a code plagiarism identification program. If your code significantly matches another student's submission, you will be reported to SJACS with the recommended penalty of an F in the course.

You may discuss solutions to specific problems with other students, but you should not look through another's code. The code can be from an online forum or another student, the source is immaterial – all code submitted in this course must be your own. Do not share your code with anyone else in this or future sections of the course, as allowing someone to copy your code carries the same penalty as copying the code yourself.

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### Tentative Course Outline

Note: Schedule subject to change

W	Topic(s)	Homework
1	Introduction	
	Why Statistics?	
2	Probability	HW01 assigned
	Discrete Distributions	
3	Discrete Distributions	
	Continuous Distributions	
4	Continuous Distributions	HW02 assigned
	Continuous Distributions	
5	Limits	
	Convergence	
6	Point Estimation	
	Confidence Intervals	
7	Confidence Intervals	HW03 assigned
	Confidence Intervals	
8	Review	
	Review	
9	Midterm, March 5th	
	Undecided yet	
<b>SPRING BREAK</b>		
10	Hypothesis Testing	HW04 assigned
	Hypothesis Testing	
11	Covariance and Correlation	
	Anova	
12	Linear Regression	
	Linear Regression	
13	Linear Regression	HW5 assigned
	Linear Regression	
14	Bayesian Analysis	
15	Review	



**FINAL EXAM – as according to the final exam schedule, might do it last week instead if everyone agrees**