



## SIE 305 Introduction to Engineering Probability and Statistics Fall 2022

**Instructor:** Savanna Silva

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**Course Format:** Live

**Class Hours:** 1:00 p.m. to 3:30 p.m. F; EB 127

**Virtual Office Hours (By Appointment/Zoom):** M, T, W, Th: 6:00 p.m. to 8:30 p.m.

### COURSE DESCRIPTION

Axioms of probability, discrete and continuous distributions, sampling distributions. Engineering applications of statistical estimation, hypothesis testing, confidence intervals.

### PREREQUISITES

MATH 129 (or accepted equivalents)

### CREDIT HOURS 3

### COURSE TOPICS

1. Basic Probability
2. Discrete Random Variables
3. Continuous Random Variables
4. Descriptive Statistics
5. Functions of Random Variables
6. Point Estimation
7. Sampling Distribution
8. Statistical Intervals
9. Hypothesis Tests

### TEXTBOOK

Devore, J. (2012). Introduction to Engineering Probability and Statistics SIE 305 University of Arizona (9th ed.). Mason, Ohio: Cengage Learning. [ISBN: 978-1-337-76527-5]

### COURSE WEBSITE

We'll be using D2L (<https://d2l.arizona.edu/>). All class materials, including homework assignments, lecture notes, supplementary readings, etc. will be distributed in D2L. I will be utilizing the announcements function in D2L, please be sure to check your email at least twice a week for important updates.

### HOMEWORK

Homework assignments are posted on D2L. All homework problems are taken directly from the course textbook. There are eight total homework assignments. Homework **assignment** dates are highlighted in **bold** in the course activities table in this syllabus.

Homework is due via the drop box on D2L not later than 11:59 p.m. local time on the dates indicated.

### **TERM PROJECT**

Students will work together in small teams; all team members will receive the same grade for the overall project. There are four project deliverables: a project proposal abstract (example format on D2L), a project proposal presentation, a written project report, and a project presentation. The purpose of the term project is to provide a venue for students to develop, practice, demonstrate, and receive feedback on their ability to apply concepts and techniques taught in the course in a collaborative, time constrained, goal-oriented environment which partially replicates conditions found in professional practice. Student teams will perform analysis using at least one technique covered in the course on an available set of data, to draw a conclusion and/or support a particular position.

### **QUIZZES**

Quizzes will be administered in class and will review material covered in the previous class discussion. There will be approximately 9 total quizzes. Quiz dates are highlighted in **bold** in the course activities table in this syllabus. All quizzes will be reviewed immediately after they have been turned in and will not be returned to the students. If the student will not be able to make it to class, coordinate with the instructor beforehand. If the student is late to class, no makeup quiz will be offered – make every attempt to be on time.

### **EXAMS**

There will be three exams administered in class and will review material covered in the class discussions, quizzes, and homework. There will be two Midterm exams (90 minutes allotted) and one Final exam (120 minutes allotted). Exam dates are highlighted in **bold** in the course activities table in this syllabus. The Midterm exams will only cover specific material, course discussion, and homework that will be reviewed prior to the scheduled exam. The Final exam will be comprehensive and will cover all material, course discussion, and homework. All exams will be reviewed during the next scheduled class and will not be returned to the students. If the student will not be able to make it to class, coordinate with the instructor beforehand. If the student is late to class, no makeup time will be offered – make every attempt to be on time.

### **COURSE EVALUATION**

- Homework [10%]
- Term Project [15%]
- Quizzes [10%]
- Attendance/Participation [5%]
- Two Midterm Exams [30%, Each Exam Worth 15%]
- Final Exam (Comprehensive) [30%]

Final Grade: A (90~100), B (80~89), C (70~79), D (50~69), E (<50)

## **ABSENCE AND CLASS PARTICIPATION POLICY**

Participating in course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their healthcare provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/2015-16/policies/classatten.htm>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02>

## **CLASSROOM BEHAVIOR POLICY**

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc). Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

## **THREATENING BEHAVIOR POLICY**

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

## **ACCESSIBILITY AND ACCOMMODATIONS**

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit <http://drc.arizona.edu/>. If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. Please be aware that the accessible table and chairs in

this room should remain available for students who find that standard classroom seating is not usable.

### **CODE OF ACADEMIC INTEGRITY**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

### **UA NONDISCRIMINATION AND ANTI-HARASSMENT POLICY**

The University is committed to creating and maintaining an environment free of discrimination, <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

### **SUBJECT TO CHANGE STATEMENT**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

## COURSE ACTIVITIES SCHEDULE

Date (Bold Dates are Dates HWs are Assigned)	Course & Discussion Schedule		Deliverable (Due NLT 11:59 PM)
Aug. 26	<ul style="list-style-type: none"> <li>» Course Intro</li> <li>» Discuss Term Project</li> <li>» Statistical Basics</li> <li>» Measures Of Location</li> </ul>	<ul style="list-style-type: none"> <li>» Measures of Variability</li> <li>» Box Plots</li> <li>» Sample Space</li> <li>» Set Theory</li> </ul>	--NONE--
<b>Sep. 2</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 1</b></li> <li>» Properties of Probability</li> <li>» Counting Techniques</li> <li>» Conditional Probability</li> </ul>	<ul style="list-style-type: none"> <li>» Independence</li> <li>» Random Variable</li> <li>» Probability Distribution</li> </ul>	<ul style="list-style-type: none"> <li>» HW1</li> <li>» Project Abstracts</li> </ul>
<b>Sep. 9</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 2</b></li> <li>» Homework 1 Solution Review</li> <li>» Expected Values</li> <li>» Binomial Distro</li> </ul>	<ul style="list-style-type: none"> <li>» Negative Binomial Distro</li> <li>» Poisson Process</li> <li>» Probability Density Functions</li> <li>» Cumulative Distro Functions</li> </ul>	» HW2
Sep. 16	<ul style="list-style-type: none"> <li>» <b>Quiz 3</b></li> <li>» Homework 2 Solution Review</li> <li>» <b>Project Proposal Presentations</b></li> <li>» Midterm Exam 1 Review</li> </ul>	» Project Proposal Presentation	
Sep. 23	<b>Midterm Exam 1</b>		
<b>Sep. 30</b>	<ul style="list-style-type: none"> <li>» Normal Distributions</li> <li>» Other Probability Distributions</li> <li>» Probability Plots</li> </ul>	<ul style="list-style-type: none"> <li>» Joint</li> <li>» Conditional</li> </ul>	» HW3
<b>Oct. 7</b> <i>[Shortened Class, Ends at 3 PM]</i>	<ul style="list-style-type: none"> <li>» <b>Quiz 4</b></li> <li>» Homework 3 Solution Review</li> <li>» Independent CRV's</li> <li>» Covariance</li> </ul>	<ul style="list-style-type: none"> <li>» Correlation</li> <li>» Statistics</li> <li>» Distributions</li> <li>» Sample Mean</li> </ul>	» HW4

Date (Bold Dates are Dates HWs are Assigned)	Course & Discussion Schedule		Deliverable (Due NLT 11:59 PM)
<b>Oct. 14</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 5</b></li> <li>» Homework 4 Solution Review</li> <li>» Central Limit Theorem</li> <li>» Linear Combination</li> <li>» Point Estimation</li> </ul>	<ul style="list-style-type: none"> <li>» Standard Error</li> <li>» Estimation Methods</li> <li>» Confidence Intervals</li> <li>» Sample Sizes</li> <li>» Confidence Bounds</li> </ul>	» HW5
Oct. 21	<ul style="list-style-type: none"> <li>» <b>Quiz 6</b></li> <li>» Homework 5 Solution Review</li> <li>» Midterm Exam 2 Review</li> <li>» Interval</li> </ul>	<ul style="list-style-type: none"> <li>» T-Test</li> <li>» Tolerance</li> <li>» Variance</li> </ul>	--NONE--
Oct. 28	<b>Midterm Exam 2</b>		
<b>Nov. 4</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 7</b></li> <li>» Hypothesis Testing</li> <li>» Error Types</li> <li>» Population Mean Test</li> </ul>	<ul style="list-style-type: none"> <li>» Test of <math>P</math></li> <li>» Z-Tests</li> <li>» Test Selection</li> </ul>	» HW6
Nov. 11	Veterans Day – No Class		
<b>Nov. 18</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 8</b></li> <li>» Homework 6 Solution Review</li> <li>» Multi-Sample Inference</li> <li>» Causality</li> <li>» Sample Size Selection</li> </ul>	<ul style="list-style-type: none"> <li>» T-Test</li> <li>» Paired Data</li> <li>» Difference Based Inference</li> <li>» Variance Based Inference</li> </ul>	» HW7
Nov. 24 – 27	Thanksgiving – No Class		
<b>Dec. 2</b>	<ul style="list-style-type: none"> <li>» <b>Quiz 9</b></li> <li>» Homework 7 Solution Review + <i>Post Homework 8 Solution on Dec. 3</i></li> <li>» <b>Term Project Presentations</b></li> <li>» Final Exam Review</li> </ul>	<ul style="list-style-type: none"> <li>» HW8</li> <li>» Project Presentations</li> <li>» Project Report</li> </ul>	
Dec. 9	<b>Final Exam</b>		