SIE 305 Introduction to Engineering Probability and Statistics
Fall 2018

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Class Hours: 3:30 p.m. to 5:00 p.m. T, Th; EB 102
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>   M, W, F: 8:30 a.m. to 10:00 a.m.
>   or by appointment

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

INSTRUCTIONAL OBJECTIVES
Use basic probability correctly. Understand when and how to use discrete and continuous probability models in univariate and multivariate contexts. Apply to reliability. Derive functions of random variables. Use point estimation techniques. Develop confidence intervals, tolerance intervals, and prediction intervals. Develop tests of hypothesis in single and two-sample scenarios. Collect and describe data.

COURSE TOPICS
Basic Probability
Discrete Random Variables
Continuous Random Variables
Descriptive Statistics
Functions of Random Variables
Point Estimation
Sampling Distribution
Statistical Intervals
Hypothesis Tests

TEXTBOOK
Devore, J. (2012). *Introduction to Engineering Probability and Statistics SIE 305 University of Arizona* (8th ed.). Mason. Ohio: Cengage Learning.

ISBN: 978-1-305-31852-6

PREREQUISITES
MATH 129 (or accepted equivalents)

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, in order to draw a conclusion and/or support a particular position.

HOMEWORK
Homework assignments are posted on D2L. All homework problems are taken directly from the course textbook. There are eight total homework assignments. Homework due 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.

COURSE EVALUATION
- o Homework …………………………………. 20%
- o Term Project…………………………………20%
- o Two Mid-term Exams ……………………… 30% (15% each)
- o Final Exam (comprehensive) ………………. 30%
- o 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	TOPIC	READING
Aug 21, 2018	Course Intro	Syllabus
Aug 23, 2018	Statistical basics	pp. 1-22
Aug 28, 2018	Measures of location, measures of variability, box plots	pp. 28-42
Aug 30, 2018	Sample space, set theory, properties of probability	pp. 50-62
Sep 4, 2018	Counting techniques, conditional probability, independence	pp.64-86
Sep 6, 2018	Random variable, probability distribution, expected values	pp. 92-113
Sep 11, 2018	Binomial distro, negative binomial distro, Poisson process	pp. 114-131
Sep 13, 2018	Probability density functions, cumulative distro functions	pp. 137-152
Sep 18, 2018	**Project proposal presentations**	See D2L
Sep 20, 2018	**Exam 1**	See D2L
Sep 25, 2018	Normal distributions	pp. 152-162
Sep 27, 2018	Other probability distributions, probability plots	pp. 165-187
Oct 2, 2018	Joint, Conditional, Independent CRV's	pp. 193-203
Oct 4, 2018	Covariance, correlation, statistics, distributions	pp. 206-221
Oct 9, 2018	Sample mean, central limit theorem, linear combination	pp. 223-233
Oct 11, 2018	Point estimation, standard error, bootstrapping	pp. 239-252
Oct 16, 2018	Estimation methods	pp. 255-264
Oct 18, 2018	Confidence intervals, sample sizes, confidence bounds	pp. 267-283
Oct 23, 2018	Interval, t-test, tolerance, variance	pp. 285-296
Oct 25, 2018	**Exam 2**	See D2L
Oct 30, 2018	Hypothesis testing, error types, population mean test	pp. 300-320
Nov 1, 2018	Test of p and P, z-tests, test selection	pp. 323-337
Nov 6, 2018	Multi-sample inference, causality, sample size selection, t-test	pp. 345-365
Nov 8, 2018	Paired data	pp. 365-371
Nov 13, 2018	Difference based inference	pp. 375-380
Nov 15, 2018	Variance based inference	pp. 382-385
Nov 20, 2018	Term projects	See D2L
Nov 27, 2018	Term projects and review	See D2L
Nov 29, 2018	**Project presentations** and review	See D2L
Dec 4, 2018	**Final Exam**	See D2L