

SIE 305- Introduction to Engineering Probability and Statistics

Spring 2021, University of Arizona

Instructor:	Dr. Donald Bruyère Office: ENGR 154, Phone #: 520-621-2298 Email: dbruyere@email.arizona.edu Office Hours: Monday & Wednesday 8:00 am to 9:30 am via Zoom
Teaching Assistants:	Samuel Erickson: samuellerickson@email.arizona.edu ; (Grader) Tuesday/Thursday 10:30 – noon via Zoom (ID 830 1468 7961) Apurba Saha: apurbasaha@email.arizona.edu ; Tuesday/Thursday 2:30 – 4:00 pm via Zoom (ID 819 6308 8717)
Class meetings:	Monday, Wednesday, Friday, 10:00 – 10:50 am, Live On-Line via Zoom
Catalog description:	Axioms of probability, discrete and continuous distributions, sampling distributions. Engineering applications of statistical estimation, hypothesis testing, confidence intervals.
Prerequisite(s):	MATH 129 Each student must be able to do: 1. Differentiate (derivatives of exp., log, and polynomial, etc.) 2. Integrate (single integrals, simple double integrals)
Textbook (required):	Devore, Jay L. <i>Introduction to Engineering Probability and Statistics</i> , CENGAGE Learning. (Available on-line through WebAssign)
Software packages:	MS Excel (“R” and Minitab will be optional).
Course learning outcomes:	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 hypotheses in single and two-sample scenarios. Collect and describe data.
Topics covered:	<ul style="list-style-type: none">• Combinatorics• Basic Probability• Discrete R.V.• Continuous R.V.• Descriptive Stats.• Function of R.V.• Joint R.V.• Point Estimation• Sampling Dist.• Stat. Intervals• Hypothesis Tests

D2L Website – You will access this site by going to <http://d2l.arizona.edu> and logging in with your UA Net ID. If you need assistance with D2L you should contact D2L Help (<http://help.d2l.arizona.edu>); you may also try the 24/7 IT Support center on campus (<http://the247.arizona.edu>), which is available 24 hours a day, 7 days a week. When you log on to D2L, this course will be listed on the welcome page under “My Courses”. Announcements, class notes, PowerPoint files, spreadsheets used in class, homework assignments and solutions, exams from previous semesters, discussion questions, and links to news items of interest will posted to this website. You must be registered for the class to be permitted entry to the site.

Weekly Assignments

- a. All assignments will be taken from the text book.
- b. Quantity: The course will include 10+homework assignments.
- c. Teams: **You may work in teams of 3 or less students on the weekly assignments, but each student should turn in his/her own assignment**, or you may complete your homework individually.
- d. Timeliness: Unless announced differently, homework will be posted on a Friday, and must be submitted by D2L Drop Box by 9:00 pm on the second Monday of the week after the homework is assigned. This means that you might have a new homework assignment prior to handing in your previous assignment. You may always submit it early via D2L. Homework submitted up to 24 hours after due date will have 20% deducted from the total score. For homework submitted 24 hours to 48 hours after the due date, the deduction is 40%, and NO homework will be accepted after the beginning of the class following the due date. Therefore, if homework is due on Monday, you must turn it in by the beginning of the class on Wednesday to get any credit at all. If you have a valid reason for handing in late homework, you must let me know in advance. Emergencies will be considered on a case-by-case basis. Homework assignments must be submitted on D2L. Homework cannot be emailed, faxed, given to the department secretary, stuffed into my or T.A.'s mailbox, or slipped under our office doors. Keep your returned homework.
- e. Academic integrity: Students are expected to uphold the University of Arizona academic integrity policy. Copied homework is not difficult to detect. Penalties for turning in copied homework are as follows: first offense – warning and 0% credit for copied problems for all parties; second offense – all parties involved will score a non-droppable 0% for the assignment; third offense – failing grade in the course. Group work is a great way to learn, and study groups are encourage, but you should try the problems on your own first, for your own benefit and also to be fair to the group.
- f. Quality: Always indicate your answers clearly. Please print your name on each sheet. Anything that cannot be read will be considered wrong. Please remember that it's easier to claim more partial credit if your homework is clearly done.

Exams

- a. There will be 3 exams during the semester and a final exam at the end of the semester. Final exam will be cumulative.
- b. Exams are closed-book, but you may bring a sheet of paper with useful information handwritten on both sides and with your name printed on it. You can also bring the previous exam's note sheet to subsequent exams. Therefore, on exam 3, you will have three note sheets; one from the first exam, one from the second, and a newly created one for exam three. You will be allowed the same three note sheets on the final exam.
- c. Exams will be proctored by Examity®, and students are referred to the Examity student reference manual also included under D2L>Content>Syllabus.
- d. Calculators may not connect wirelessly to internet or to each other.
- e. All cellphones must be OFF and put away during exams. This applies to class time, too.
- f. Anyone caught acting against UA Code of Academic Integrity, will receive a non-droppable grade of zero on an exam.

- g. Re-grade requests may be submitted ONLY in the class following the return of the exam, and they MUST be in writing. Attach a note describing clearly why you think you deserve more points. Any detected post-exam manipulation of your paper will result in a non-droppable grade of zero on the exam. Requests for regarding may open the possibility of the entire test being re-graded, which may or may not be in your favor.
- h. If you are stuck on a problem and write a verbal explanation of how you might approach it and what concepts apply, you will get partial credit. Partial credit is better than no credit!
- i. Exam scope. Tests and exams will never cover probability/statistics topics far beyond the realm of topics covered in class, or addressed on related textbook pages. Some questions that are similar, yet not identical, to homework exercises may appear on examinations.

Grading – The final grades will be given based on weekly assignments, 3 exams, quizzes, and a final exam.

Reading Checks	9%
Homework Assignments	10%
Quizzes	15%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final	21%
Total	100%

Collaboration Exercises – We will be introducing questions in class that require responses from attending students through a corresponding quiz under D2L Quizzes. Collaboration exercise response has the potential for raising final grades for threshold cases for good clicker response during class.

Accessibility and Accommodations - At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

Academic behavior - If any form of academic dishonesty occurs in this course, procedures as given by the Dean of Students will be followed. The reduction in credit in the following bulleted list is the minimum action to be taken – other actions (e.g., notes on transcripts, reduction in final grade in course) may be taken as deemed appropriate.

- You are encouraged to work together on homework assignments, but do not copy someone else’s work and do not let other people copy yours. If an individual assignment has been copied, then ALL copies (including the original) will receive a grade of zero.
- Plagiarism is a serious offense! Students are advised to review the library site (<http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>) on plagiarism. Plagiarized material will receive a zero score and the incident will be reported to the dean.
- Anyone found cheating on an exam is in violation of the Student Code of Academic Integrity and will receive a zero on that exam and will be reported to the Dean of Students or appropriate designee.
- The Arizona Board of Regents’ Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one’s self. See: <http://policy.web.arizona.edu/~policy/threaten.shtml>.

Academic integrity policy – Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work, exercises, homework, and exams must be the product of independent effort unless otherwise instructed. Students are expected to know and to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://catalog.arizona.edu/2011-12/policies/aaindex.html>

<http://deanofstudents.arizona.edu/codeofacademicintegrity>

Any violation of the academic integrity code will be dealt with using the procedures detailed in the code.

Confidentiality of Student Records – the UA policy on confidentiality is on the web at:

<http://www.registrar.arizona.edu/ferpa/default.htm>

Classroom Behavior Policy – The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.web.arizona.edu/~policy/threaten.shtml>.

Restricted communication devices - Cell phones and other communication devices are to be turned off during class and during examinations. Lap top computers are prohibited during exams.

University absence policies - 1) All holidays of special events observed by organized religions will be honored for those students who have affiliation with that particular religion. 2) Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

Revisions - Modifications may occur in this syllabus. The grading policy, regarding tests, exams, and homework is rigidly fixed. Students will receive timely updates on any modifications.

Student feedback - Students may be asked to provide feedback on the course and its contents.

Course Schedule as of 1/5/21

Monday	Wednesday	Friday
1/11	1/13 RC <i>Chapt 1</i>	1/15 Hw 1Assigned
	<i>Chapter 1</i> Overview	Descriptive Statistics: Histograms, Stem Leaf, and Box Plots
1/18	1/20 RC <i>Chapt 2</i>	1/22 Hw 2Assigned
NO CLASS – Dr.Martin Luther King Jr. Day	Descriptive Statistics: Histogram shapes, measures of location, measures of variation	<i>Chapter 2</i> - Events, Probability & Sample Spaces
1/25 Hw1 Due	1/27	1/29
Axioms of Probability	Conditional Probability/ Independence	Bayes Rule/Total Probability Quiz 1
2/1 Hw 2 Due	2/3 RC <i>Chapt 3</i>	2/5 Hw 3Assigned
Counting Problems: Combinations/Permutations	<i>Chapter 3</i> Random Variables, Expected Value, Mean, Variance	Review
2/8	2/9	2/11
Exam 1	Cumulative Distribution Functions (CDF's)	Discrete Distributions: Geometric, Bernoulli, and Binomial
2/15	2/17 RC <i>Chapt 4</i>	2/19 Hw 4Assigned
Discrete Distributions: Hypergeometric	Discrete Distributions: Negative Binomial	Discrete Distributions: Poisson Quiz 2
2/22 Hw 3 Due	2/24	2/26 Hw 5Assigned
<i>Chapter 4</i> Continuous Distributions	Continuous Distributions: Normal/Gaussian	Continuous Distributions: Exponential, Gamma, X^2
3/1 Hw 4 Due	3/3	3/5
Continuous Distributions: Weibull, Beta	Probability Plots	Quiz 3 Review Exam 2 Material
3/8	3/10	3/12
Collaboration Review	Reading Day	Exam 2
3/15 Hw 5 Due	3/17 RC <i>Chapt 5</i>	3/19 Hw 6Assigned
<i>Chapter 5</i> Joint Distributions (JDs)	Calculating Marginal Probabilities from JDs	Properties of JDs: Expected Value, Covariance
3/22	3/24 RC <i>Chapt 6</i>	3/26 Hw 7Assigned
Sample Statistics	<i>Chapter 6</i> Point Estimation	Method of Moments & Maximum Likelihood Estimation Quiz 4
3/29 Hw 6 Due	3/31 RC <i>Chapt 7</i>	4/2
<i>Chapter 7</i> Confidence Intervals	t-Distributions	Reading Day
4/5 Hw 7 Due	4/7	4/9 Hw 8Assigned
Prediction Intervals & Tolerance Intervals	One sided vs. Two Sided Intervals	Intervals for Sample Variance
4/12	4/14 RC <i>Chapt 8</i>	4/16 Hw 9Assigned
Review Exam 3 Material	Collaboration Review	Exam 3
4/19 Hw 8 Due	4/21	4/23 Hw 10Assigned
<i>Chapter 8</i> Hypothesis Testing	Reading Day	Measuring α error and Understanding β
4/26 Hw 9 Due	4/28 RC <i>Chapt 9</i>	4/30
P-Values	Ch 9 Inferences Based on 2 Samples	Quiz 5
5/3 Hw 10 Due	5/5	5/7
Chapter 8 & 9 Review	Class Review	Final 10:30 am to 12:30 pm