SIE 305- Introduction to Engineering Probability and Statistics
## Fall 2021, University of Arizona

Instructor:	Dr. Donald Bruyère Office: ENGR 154, Phone #: 520-621-2298 Email: dbruyere@email.arizona.edu Office Hours: Mo & Wed 10:30am to 12:00pm or by appointments
Teaching Assistants:	Md Habibor Rahman Email: habiborrahman@email.arizona.edu Office hours: 4.00 pm to 5.30 pm in ENGR 124 Minhang Zhou, Email: Lilyzmh@email.arizona.edu Office hours: 8:30 am to 10:00 am via Zoom.
Class meetings:	Mon, Wed, Fri, 1:00–1:50pm, ILC Room 141
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. *Introduction to Engineering Probability and Statistic*, CENGAGE Learning. (On-Line through D2L)
Software packages:	MS Excel,"R", and/or Minitab (optional, but encouraged)
Other:	Clicker (Turning Technologies Response Card, picture pg 3.)
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:	- 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 etext book, (picture below right). This will be available on the D2L website described above. You will have purchased the license to use the text automatically as a part of the fees that you realize when you enroll in the class.

b. Reading assignments will be provided weekly, and an on-line Reading Check must be completed through D2L by the dates indicated on the schedule on page 5. DO THE READING BEFORE YOU START THE READING CHECK.

c. Each student will be reasonable for completing 10 homework assignments on-line through Web Assign. Due dates for assignments are as indicated on the schedule on page 5. No late homework will be accepted. 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.

d. Academic integrity: Students are expected to uphold the University of Arizona academic integrity policy.

e. Quality: Although the homework answers are submitted through Web Assign, it is a good practice to work through the homework in a spiral notebook. That way, you can review your work with the professor or the grader if you are having problems understanding the assignment. Always write legibly and write out each step of the process indicating your answers clearly at the end.
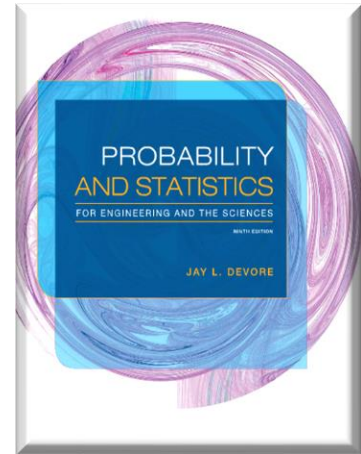
Exams

a. There will be one midterm exam 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 two hand annotated sheets of paper with useful information handwritten on both sides and with your name printed on it for the midterm. You will be allowed the three note sheets on the final exam.

c. Calculators may not be programmed unfairly or connect wirelessly to internet or to each other.

d. All cellphones must be OFF and put away during exams. This applies to class time, too.

e. No one will be allowed to leave the room once the exam starts, unless they've handed in their exam.

f. Anyone caught acting against UA Code of Academic Integrity, will receive a non-droppable grade of zero on an exam.

g. 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!

h. 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 completion of the Reading Checks under D2L>Quizzes,

weekly assignments on Web Assign, 4 quizzes (also through D2L>Quizzes), a midterm, and a final exam.

Reading Checks	5%
Homework Assignments	15%
Quizzes	15%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final	20%
Total	100%

Attendance policy –We will be introducing collaboration questions in class that require real time responses through D2L quizzes. Make sure that you bring a device that provides you access to the quizzes during the class. Those of you attending remotely will also be able to respond to the questions as well.

Material that is not in the text will be presented in class as well. In class examples are performed, demonstrations will be done with the computer, and discussions will be conducted on the material. All material from the class is fair game on the exams. It is critical that you do not miss class, since material will not be repeated or private tutoring will not be given. If you are continuously absent, you are taking on a huge risk of failing the course and you will miss the social structure of the class. The Web page can be used as a backup for a missed class and for additional help, but it is not a substitute for class activities, discussions, demonstrations, and performed examples. Missed announcements that may pertain to exam schedules, modifications in syllabus, handouts, and homework assignments are your responsibility to obtain if you miss a class.

Students with Special Needs - Students with disabilities or special needs who require accommodations to fully participate in course activities or meet course requirements must register with the S.A.L.T. Center or Disability Resource Center. Students needing special accommodations should contact SALT, 1010 N Highland Ave., or the Center for Disability Related Resources, 1224 E. Lowell Street, for documentation of special needs. If you qualify for special accommodations, bring your letter of request to the instructor as soon as possible. An exam taken in the DRC testing center is to be taken at exactly the same time the exam is given in class.

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.
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- 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 written feedback on the course and its contents.

Monday	Wednesday	Friday
8/23	**8/25** `Reading Check Ch1`	**8/27** `Hw 1Assigned`
Course outline	*Chapter 1* Overview	Descriptive Statistics: Histograms, Stem Leaf, and Box Plots
8/30	**9/1** `Reading Check Ch2`	**9/3** `Hw 2 Assigned`
Descriptive Statistics: Histogram shapes	*Chapter 2* - Events, Probability & Sample Spaces	Axioms of Probability
9/6	**9/8** `Hw1 Due`	**9/10**
NO CLASS – Labor Day	Conditional Probability & Independence	Bayes Rule/Total Probability `Quiz 1 Available`
9/13 `Hw 2 Due`	**9/15** `Reading Check Ch3`	**9/17** `Hw 3 Assigned`
Counting Problems: Combinations/Permutations	*Chapter 3* Random Variables, Expected Value, Mean, Variance	Review
9/20	**9/22**	**9/24**
`Exam 1`	Cumulative Distribution Functions (CDF's)	Discrete Distributions: Geometric, Bernoulli, and Binomial
9/27 `Hw 3 Due`	**9/29** `Reading Check Ch4`	**10/1** `Hw 4 Assigned`
Discrete Distributions: Hypergeometric	Discrete Distributions: Negative Binomial	Discrete Distributions: Poisson `Quiz 2 Available`
10/4	**10/6**	**10/8** `Hw 5 Assigned`
Chapter 4 Continuous Distributions	Continuous Distributions: Normal/Gaussian	Continuous Distributions: Exponential, Gamma, X^2
10/11	**10/13**	**10/15**
Continuous Distributions: Weibull, Beta	Probability Plots	Review
10/18 `Hw 4 Due`	**10/20** `Reading Check Ch5`	**10/22** `Hw 6 Assigned`
Clicker Exercise	`Exam 2`	*Chapter 5* Joint Distributions (JDs)
10/25 `Hw 5 Due`	**10/27** `Reading Check Ch 6`	**10/29** `Hw 7 Assigned`
Calculating Marginal Probabilities from JDs	Properties of JDs: Expected Value, Covariance	Sample Statistics `Quiz 3 Available`
11/1 `Hw 6 Due`	**11/3** `Reading Check Ch7`	**11/5** `Hw 8 Assigned`
Chapter 6 Point Estimation	Method of Moments & Maximum Likelihood Estimation	*Chapter 7* Confidence Intervals:
11/8 `Hw 7 Due`	**11/10** `Reading Check Ch8`	**11/12** `Hw9 Assigned`
t-Distributions	Prediction Intervals	Tolerance Intervals `Quiz 4 Available`
11/15	**11/17**	**11/19** `Hw 10 Assigned`
One vs. Two Sided Intervals & Intervals for Sample Variance	Review	`Exam 3`
11/22	**11/24** `Hw 8 Due`	**11/26**
Chapter 8 Hypothesis Testing	Measuring α error Understanding β error	Thanksgiving Holiday
11/29 `Reading Check Ch9`	**12/1** `Hw 9 Due`	**12/3**
Proportion Hypothesis Testing	P-Values	Inferences Based on 2 Samples `Quiz 5 Available`
12/6	**12/8** `Hw 10 Due`	**12/10**
Review	Clicker Review	No Class
12/13	**12/15**	**12/17**
`Final`	No Class	Happy Holiday
`Final Exam` Monday Dec 13th, 1:00 to 3:00 pm		