

## SIE 305- Introduction to Engineering Probability and Statistics Spring 2025, University of Arizona

- Instructor:** Dr. Mike Kwinn  
Office: ENGR 107  
Email: [kwinnm@arizona.edu](mailto:kwinnm@arizona.edu)  
Office Hours: by appt
- Teaching Assistants:** Minhang Zhou [lilyzmf@arizona.edu](mailto:lilyzmf@arizona.edu)  
Office Hours: T&Th 9-10 am via Zoom or in person by appt
- Md Fantacher Islam [fantacher@arizona.edu](mailto:fantacher@arizona.edu)  
Office Hours: : M&W 11-12 via Zoom or in person by appt
- Class meetings:** Mon, Wed, Fri, 10:00–10:50am, 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:  
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 Statistics*, CENGAGE Learning. (On-Line through D2L)
- Software packages:** MS Excel, “R”, and/or Minitab (optional, but encouraged)
- Outcome Related Course Learning Objectives:**
- Understand and apply basic probability correctly
  - Understand when and how to use discrete, continuous and joint probability distributions
  - Describe the use of point estimation
  - Analyze confidence intervals and hypothesis testing for a single sample
  - Analyze confidence intervals and hypothesis testing for two samples
  - Conduct Goodness-of-Fit tests
- Topics covered:**
- Descriptive statistics.
  - Basic probability
  - Discrete and continuous random variables
  - Joint random variables
  - Point estimation
  - Statistical intervals based on a single sample
  - Test of hypothesis based on a single sample
  - Inferences based on two samples
  - Goodness-of-Fit 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, and links to news items of interest will be posted to this website. You must be registered for the class to be permitted entry to the site.

## Grading:

The final grades will be computed according to the table below. Grades are earned and they are not given. *Final grades are based on your performance throughout the semester and not on the generosity of the professor.* The beginning of the semester and throughout the semester is the time to be concerned about your grades, not after the final exam.

Homework assignments	10%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Field Trip Reports	10%
Course Project	15%
Final	20%
<b>Total</b>	<b>100%</b>

## Homework Assignments

- All assignments will be taken from the etext book, (Figure 1). This will be available on the D2L website described above. You have to purchase the license to use the text automatically as a part of the fees that you realize when you enroll in the class.
- Reading assignments are listed in the lesson plan and should be completed prior to class.
- Each student will be responsible for completing 10 homework assignments on-line through WebAssign. Due dates for assignments are as indicated on the schedule on page 7. If you need an extension on the homework, you must notify me ahead of time via email. 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.

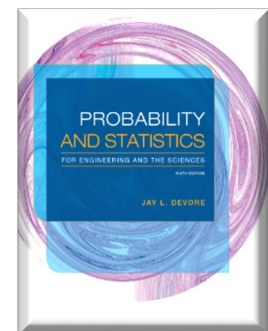


Figure 1: Devore, Jay L.  
*Introduction to Engineering  
Probability and Statistics*

- d. Academic integrity: Students are expected to uphold the University of Arizona academic integrity policy.
- e. Quality: Although the homework answers are submitted through WebAssign, 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 a TA 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 three midterm exams during the semester and a final exam at the end of the semester. The final exam will be comprehensive.
- b. Exams are closed book, but you may bring two sheets of paper with useful information **handwritten** on both sides and with your name printed on it for each 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 have 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. Unless are registered for the online section of the course and have paid a fee, you must take the midterms and the final exam in person during the designated class period. *For online students only*, we will be using Honorlock to proctor the exams.

## Field Trips and Reports:

There will be two “field trips” during the course. Participation in these is mandatory. You will develop a data set as a group and then complete a report individually. Online students will be provided the data set to do the lab report. It is important to note that the report will be done individually, not as a group. If you are part of the in-person, main campus course, you must be at the field trip event to collect the data. If you are not at the event without a Dean’s Excuse, you

will not be able to complete the lab report and you will receive a zero for the assignment. If you have a special circumstance, you must coordinate prior to the event.

### **Course Project:**

There will be a course project that will be conducted in small groups. This project will be a real-world application of the course material and is designed to bring the theory to life for the students. More specific information about the project will be shared later in the semester in a separate document.

### **Attendance policy:**

**Attendance for all exams is mandatory. To miss a scheduled exam, you must have a Deans Excuse and notify the instructor ahead of time.** Class time is the best time to interact with the instructor and clarify information presented. It also helps make the class better when there are students there with whom to collaborate and learn. There will be material that is not in the text that will be presented in class. 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. The webpage 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 if you miss a class.

- All holidays of special events observed by organized religions will be honored for those students who have affiliation with that religion. Please work with the instructor to ensure awareness of the holiday. It is not the instructor's responsibility to track all the holidays.
- Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

### **Classroom Behavior Policy:**

Cell phones and other communication devices are to be turned off during class and during examinations. For exams taken on laptops, you will not be allowed to visit other sites during the exam. Visiting other sites, using Excel macros/prepared workbooks, or checking other material on the laptop is prohibited and will be handled in accordance with the Academic Integrity Policy described below.

### **Threatening Behavior Policy:**

The University seeks to promote a safe environment where students and employees may participate in the educational process without compromising their health, safety, or welfare. The Arizona Board of Regents (ABOR) Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to oneself. Threatening behavior can harm and disrupt the University, its community, and its families.

## **Academic Integrity Policy:**

Integrity and ethical behavior are expected of every student in all academic work. This Academic Integrity principle stands for honesty in all class work, and ethical conduct in all labs and clinical assignments. This principle is furthered by the Student Code of Conduct and disciplinary procedures established by [\*\*ABOR Policies 5-308 through 5-404\*\*](#) (see chapter 5), all provisions of which apply to all University of Arizona students. This Code of Academic Integrity (hereinafter "this Code") is intended to fulfill the requirement imposed by [\*\*ABOR Policy 5-403.A.4\*\*](#) and otherwise to supplement the Student Code of Conduct as permitted by [\*\*ABOR Policy 5-308.C.1\*\*](#).

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.htm>
- <https://deanofstudents.arizona.edu/policies/code-academic-integrity>

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

## **Use of Generative AI**

In this course any and all uses of generative artificial intelligence (AI)/large language model tools such as ChatGPT, Dall-e, Google Bard, Microsoft Bing, etc. will be considered a violation of the Code of Academic Integrity, specifically the prohibition against submitting work that is not your own. This applies to all assessments in the course, including case studies, written assignments, discussions, quizzes, exams, and problem sets. The following actions are prohibited:

- entering all or any part of an assignment statement or test questions as part of a prompt to a large language model AI tool;
- incorporating any part of an AI-written response in an assignment;
- using AI to summarize or contextualize reading assignments or source materials; and
- submitting your own work for this class to a large language model AI tool for iteration or improvement.

## **Nondiscrimination and Anti-Harassment Policy**

The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex (including pregnancy), national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. The University encourages anyone who believes they have been the subject of discrimination to report the matter immediately as described in the section below, "Reporting Discrimination, Harassment, or Retaliation." All members of the University

community are responsible for participating in creating a campus environment free from all forms of prohibited discrimination and for cooperating with university officials who investigate allegations of policy violations.

**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.

If you qualify for special accommodations, please coordinate with the instructor to make sure we support all your accommodations. An exam taken in the DRC testing center is to be taken at the same time the exam is given in class.

**Revisions:**

Modifications may occur in this syllabus. The instructor will share any changes as soon as practical in class and through class announcements on D2L.

**Student feedback:**

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

Monday	Wednesday	Friday
	15 Jan – Lesson 1	17 Jan – Lesson 2
	<b>Chapter 1</b>	
	Read 1.1 Populations, Samples and Processes	Read 1.2 Pictorial and Tabular Methods in Descriptive Statistics
20 Jan	22 Jan – Lesson 3	24 Jan – Lesson 4
<b>MLK Day No Class</b>	<b>Chapter 1</b>	
	Read 1.3 and 1.4 Measures of Location and Measures of Variability	Read 2.1 and 2.2 Sample Spaces, Events, and Properties of Probability <b>Homework 1 due</b>
27 Jan – Lesson 5	29 Jan – Lesson 6	31 Jan – Lesson 7
<b>Chapter 2</b>		
Read 2.3 Counting Techniques	Read 2.4 and 2.5 Conditional Probability and Independence	<b>Field Trip 1: Probability in the Wild</b>
3 Feb – Lesson 8	5 Feb – Lesson 9	
Review <b>Homework 2 due</b>	<b>Exam 1</b>	Introduction to R
10 Feb – Lesson 11	12 Feb – Lesson 12	14 Feb – Lesson 13
<b>Chapter 3</b>		
Read 3.1 and 3.2 Random Variables and Discrete Probability Distributions <b>Field Trip 1 Report Due</b>	Read 3.3 and 3.4 Expected Values and the Binomial Probability Distribution	Read 3.5 and 3.6 Hypergeometric, Negative Binomial and Poisson Probability Distributions
17 Feb – Lesson 14	19 Feb – Lesson 15	21 Feb – Lesson 16
<b>Chapter 4</b>		
Read 4.1 and 4.2 Probability Density and Cumulative Distribution Functions <b>Homework 3 due</b>	Read 4.3 and 4.4 The Normal Distribution and the Exponential and Gamma Distributions	Read 4.5 and 4.6 Other Continuous Distributions and Probability Plots
24 Feb – Lesson 17	26 Feb – Lesson 18	28 Feb – Lesson 19
<b>Chapter 5</b>		
Read 5.1 Jointly Distributed Random Variables <b>Homework 4 due</b>	Read 5.2 Expected Values, Covariance, and Correlation	Read 5.3, 5.4 and 5.5 Sample Statistics, their Distributions and Linear Combinations
3 Mar – Lesson 20	5 Mar – Lesson 21	7 Mar – Lesson 22
Review <b>Homework 5 due</b>	<b>Exam 2</b>	Course Project Kick-off
10 Mar	12 Mar	14 Mar
<b>Spring Break – No Classes</b>		

<b>17 Mar – Lesson 23</b>	<b>19 Mar – Lesson 24</b>	<b>21 Mar – Lesson 25</b>
<b>Chapter 6</b>		<b>Chapter 7</b>
Read 6.1 Some General Concepts of Point Estimation	Read 6.2 Methods of Point Estimation	Read 7.1 and 7.2 Confidence Intervals and Large-Sample Confidence Intervals for a Population Mean and Proportion <b>Homework 6 due</b>
<b>24 Mar – Lesson 26</b>	<b>26 Mar – Lesson 27</b>	<b>28 Mar – Lesson 28</b>
<b>Chapter 7</b>	<b>Chapter 8</b>	
Read 7.3 and 7.4 T-Distributions, Variance and Standard Deviation Confidence Intervals	Read 8.1 Hypotheses and Test Procedures <b>Homework 7 due</b>	Read 8.2 Tests About a Population Mean <b>Project Proposal Due</b>
<b>31 Mar – Lesson 29</b>	<b>2 Apr – Lesson 30</b>	<b>4 Apr – Lesson 31</b>
<b>Chapter 8</b>		<b>Field Trip 2: Statistics in the Wild</b>
Read 8.3 Tests Concerning a Population Proportion	Read 8.4 P-Values	
<b>7 Apr – Lesson 32</b>	<b>9 Apr – Lesson 33</b>	<b>11 Apr – Lesson 34</b>
		<b>Chapter 9</b>
Review <b>Homework 8 due</b>	<b>Exam 3</b>	Read 9.1 z Tests and Confidence Intervals for a Difference Between Two Population Means
<b>14 Apr – Lesson 35</b>	<b>16 Apr – Lesson 36</b>	<b>18 Apr – Lesson 37</b>
Read 9.2 The Two-Sample t-Test and Confidence Interval <b>Field Trip 2 Report Due</b>	Read 9.3 Analysis of Paired Data	Read 9.4 Inferences Concerning a Difference Between Population Proportions
<b>21 Apr – Lesson 38</b>	<b>23 Apr – Lesson 39</b>	<b>25 Apr – Lesson 40</b>
<b>Chapter 9</b>	<b>Chapter 14</b>	
Read 9.5 Inferences Concerning Two Population Variances	Read 14.1 Goodness-of-Fit Tests When Category Probabilities are Completely Specified <b>Homework 9 due</b>	Course Project Workday
<b>28 Apr – Lesson 41</b>	<b>30 Apr – Lesson 42</b>	<b>2 May – Lesson 43</b>
Course Project Workday	Course Project Workday <b>Homework 10 due</b>	Poster Session for Final Project
<b>5 May – Lesson 44</b>	<b>7 May – Lesson 45</b>	<b>9 May</b>
Review for Final	Review for Final	<b>Final Exam 10:30am-12:30pm</b>