Syllabus

MATH 4361 Statistics for the Sciences
Dr. Pamela Lockwood
Spring 2025

Contact Information and Office Hours –

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Office Hours: Online through the Discussion Board or Course Messages; In-person hours: TH 10:00 – 11:00 AM; MW 1:30 – 2:30 PM

Texts and Other Materials –

Required Text provided by University through Classroom Management System: *Statistics for Engineers and Scientists, 6th edition, William Navidi, ISBN 978-1-266-67291-0*

Other Required Materials (software, other readings, etc.):

You will need a statistical software package. The easiest two options are STATA and Minitab. Both are available for 6 month rental. I will place those links below. I will try to use both in instructional videos due to their prevalence in industry. R is a free download and a program used vastly in many disciplines. Learning some R programming you can put on your resume if it is route you would like to take, I applaud you.

WTAMU has a campus grad plan set up with STATA. You can find purchasing or rental options for STATA on your personal computer at the following location. **STATA BE should be fine for anything we do.**

https://www.stata.com/order/new/edu/gradplans/student-pricing

Minitab can be rented here:

https://www.minitab.com/en-us/solutions/industry/academic/#tabs-69270f029f-dwaovh5qxx-tab-2

Course Description –

The purpose of this course is to provide you with a thorough understanding of concepts that form the foundation of inferential statistics. These concepts will include the basic laws of probability, discrete and continuous random variables, common probability distributions for these random variables, parameter estimation using confidence

intervals, hypothesis testing, linear regression and analysis of variance. We will take a calculus-based approach to these concepts.

Objectives/Student Learning Outcomes –

1. Manipulate and analyze data using industry level statistical software.
2. Create appropriate graphical and numerical summaries of both categorical and quantitative data for one and two variables.
3. Interpret graphs and descriptive statistics for one and two variables.
4. Appropriately apply the definition and laws of probability to problem solve.
5. Apply the concepts of expected value, variance, and associated laws for discrete and continuous random variables to solve problems related to identifying the mean and variance of functions of one or more random variables.
6. Apply and interpret the central limit theorem to solve problems that occur in statistical inference.
7. Calculate and interpret a confidence interval for an unknown population parameter or linear combination of parameters under appropriate conditions.
8. Run a statistical hypothesis test for an unknown population parameter of linear combination of parameters under appropriate conditions.
9. Investigate the relationship between two or more random variables using linear regression.
10. Investigate the relationship between three or more group population means using analysis of variance.

Program Learning Outcomes –

Program outcomes related to this course:

1. Apply mathematical techniques to model natural phenomena.
2. Communicate mathematics effectively to peers and professionals.
3. Use technology effectively as a tool in problem solving as well as an aid in understanding mathematical concepts.

Course Requirements and Evaluation –

Explanation of Assignments and Requirements:

Weekly Units: Each week a new unit will open on Monday or Tuesday morning. This unit will contain a module page that begins with a summary of the unit, learning objectives you will acquire, and a step by step guide through the unit including reading assignments, videos to view, and assessments to complete. I will strive to break up each unit in a manner so that you can sit down, read a portion of your text, watch a video and complete a few homework problems over a particular topic so that you walk away from your time at the computer feeling like you have learned something and accomplished a portion of the unit for the week. As such, set on your calendar about 3 times a week you plan to “attend my class”, and complete a portion of the unit so that you are not spending your entire Saturday or Sunday in misery learning a week’s worth of material in one day.

Homework Exercises and Quizzes: A selection of exercises will be assigned in each Unit, frequently scattered about the unit as explained above. Some exercises will be skill building activities, where you learn a new skill in a video and immediately try it out in an exercise. Others will be assigned as broader assessment activities that require the use of software to more rigorously use a set of data to address a problem, usually at the conclusion of the unit. Unit quizzes will be used when necessary to allow you to self-assess prior to an exam and also assess your knowledge of larger concepts important to your progression in the course. As with other courses, I assume that you work the homework together and support each other through the learning process. Quizzes and exams should be your individual work, the first to help prepare you for the second. The average of these assessment grades will compose 25% of your grade.

Exams: There will be three examinations throughout the semester to assess your knowledge of material over several units, checking your cumulative learning in the course. The approximate timing of these exams can be found in the tentative course schedule. They comprise 75% of your grade, 25% for each exam. Each examination will be administered online. We will use respondus monitor and lockdown browser so be certain you have the technology to accomplish this. All or a portion of the exam may be administered in a timed setting depending upon the course content of the exam. I will create a practice exam setting before exam 1 so that you know what to expect. Note Exam 3 will function as a final exam plus include course content over linear regression.

Use the Discussion Board! We will have a discussion board in each unit. Use it! If you have a question, someone else does as well. This is a 4000 level class, there is not a question you might have that is not important. These questions can be related to content in the unit, general questions over the course, or reminding Dr. Lockwood she forgot something. Get it on your phone. Get it on your computer. We learn from each other. I subscribe to the Discussion Board and receive an email notification when someone posts a question. I endeavor to answer within 24 hours unless another student has already responded. Feel free to answer each other's questions before I get there. It makes me happy.

Important Dates

Monday, March 31st is the last day to drop a course.

Final Exam Week Begins Friday, May 9th. I will poll the class enrollment within the last month of the semester to select an appropriate time frame for this exam.

CoVid 19 Restrictions and Rules

While West Texas A&M University has relaxed Covid-19 restrictions, we encourage you to continue practicing healthy habits, including social distancing where possible, wearing a face-covering if you choose to do so, and staying home when sick.

Policies and Responsibilities –

[This is the place where you can make your expectations known to students regarding classroom behavior, etc. Issues here might include your attendance policy, late work policy, cell phone policy/electronic device policy, how you will address tardiness or leaving class early, eating/drinking during class, expectations for respectful behavior

toward all students and instructor or anything else you would like to clarify. See Acceptable Student Behavior policy below.]

- Late Work Policy – Life does at times intervene. If you are in a desperate situation and cannot meet my due date, feel free to contact me with details. Due dates allow you to continue to move forward in the course in a timely manner, but I can be flexible in the event of an emergency. I WILL NOT grade late homework if I have already returned the graded assignment to the remainder of the class.
- **Due Dates in General – Each unit assessment will be due on a Monday evening. Each new unit will open on Tuesday morning.**

Academic Integrity –

All work must be completed individually unless otherwise stated. Commission of any of the following acts shall constitute scholastic dishonesty: acquiring or providing information for any assigned work or examination from any unauthorized source; informing any person or persons of the contents of any examination prior to the time the exam is given in any subsequent sections of the course or as a makeup; plagiarism; submission of a paper or project that is substantially the same for two courses unless expressly authorized by the instructor to do so. For more information, see the Student Handbook[1].

Generative AI –

Generative artificial intelligence (Generative AI) is a computer-based technology that produces a variety of data, such as pictures, videos, music, or words, which may look or sound like a person made them. Generative AI tools appear to be created by humans because they are derived from deep machine learning routines and large language models based on algorithmic comprehension of materials created by humans. West Texas A&M University recognizes that generative AI presents challenges and simultaneously offers stimulating opportunities in higher education. West Texas A&M University offers faculty members the following choice of three distinct approaches to this complex challenge:

- Use of Generative AI Permitted Under Some Circumstances with Permission—There are specific situations within this course where you will use generative AI to explore how the technology can serve as a complimentary learning tool. The course faculty member will inform when, where, and how you may employ these tools, along with guidance for attribution. Any use outside the faculty defined parameters constitutes a violation of academic integrity.

Acceptable Student Behavior –

Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (Student Handbook). Unacceptable or disruptive behavior will not be tolerated. Students

engaging in unacceptable behavior may be instructed to leave the classroom. Inappropriate behavior may result in disciplinary action or referral to the University's Behavioral Intervention Team. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc.

ADA Statement –

West Texas A&M University seeks to provide reasonable accommodations for all qualified persons with disabilities. This University will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to register with the Office of Student Accessibility[2] and to contact faculty members in a timely fashion to arrange for suitable accommodations. Contact Information: Student Success Center, CC 106; phone (806) 651-2335.

Title IX Statement-

West Texas A&M University is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect in an environment free of sexual misconduct and discrimination. Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. Harassment is not acceptable. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here:

- WTAMU Title IX Coordinator – Old Sub, **or** call 806.651.2389
- WTAMU Counseling Services – Classroom Center 116, **or** call 806.651.2340
- WTAMU Police Department – 806.651.2300, **or** dial 911
- 24-hour Crisis Hotline – 800.273.8255, **or** 806.359.6699, **or** 800.692.4039 NotAlone

For more information, see the Student Handbook[3].

Evacuation Statement –

If you receive notice to evacuate the building, please evacuate promptly but in an orderly manner. Evacuation routes are posted in various locations indicating all exits, outside assemble area, location of fire extinguishers, fire alarm pull stations and emergency telephone numbers (806-651-5000 or 911). In the event an evacuation is necessary: evacuate immediately do not use elevators; take all personal belongings with you; report to outside assembly area and wait for further information; students needing assistance in the evacuation process should bring this to the attention of the instructor at the beginning of the semester.

Copyright Statement

Tentative Calendar of Readings, Topics and Due Dates –

*Table 1 - **Tentative** Calendar*

Date	Chapter	Topic
Week 1-2	1.1 – 1.3	Statistical Software; Sampling; Summary Statistics; Graphical Summaries
Week 2	2.1, 2.3	Probability and Conditional Probability
Week 3	2.4, 2.5, 4.1	Random Variables and Linear Functions of Random Variables & Intro to Discrete Probability Distributions
Week 4	4.2 – 4.3 (maybe), 4.5	Discrete Probability Distributions, Normal Distributions
Week 5	4.5 – 4.7 (Maybe)	Continuous probability distributions
Week 6	**Exam 1**	**Exam 1**
Week 6	4.10, catchup, Exam 1	Probability plots and Exam 1
Week 7	4.11, 5.1 – 5.2	Central Limit Theorem, Confidence Intervals for sample mean
Week 8	Spring Break	Spring Break
Week 9	5.3, 5.4 – 5.5	Confidence Intervals for population proportion, CI for Difference in two population means or two proportions

Date	Chapter	Topic
Week 10	6.1 – 6.3	Hypothesis Testing for a Single Population Mean
Week 11	6.4 – 6.5 & 6.7	Hypothesis testing for a single population proportion; HT for difference in two means.
Week 12	6.6 & Exam 2	HT for difference in two population proportions and Exam 2
Week 12	**Exam 2**	**Exam 2**
Week 13	7.1 – 7.4	Linear Regression
Week 14	7.1 – 7.4	Linear Regression
Week 15	7.1 – 7.4	Linear Regression
Week 16	**Exam 3**	**Exam 3**

[1] https://www.wtamu.edu/student-life/handbook/index.html
[2] https://www.wtamu.edu/student-support/student accessibility/index.html
[3] https://www.wtamu.edu/student-life/handbook/index.html