ENGR 213: Engineering Probability & Statistics
Course Syllabus, Spring 2026 (sections 01E, 02E, 03E)
Rev 3, 1/10/2026

INSTRUCTOR INFORMATION

Instructor	Gerald L. Fudge, PhD
Office Location	AG/ET 217
Office Hours	Monday – Friday, except Tuesday. (9:00 am – 10:00 am) Tuesday (9:00 am – 10:30 am) Also, by appointment at other times
Phone	E&T Office: 903-886-5474
Office Fax	903-886-5960 (Inform instructor if fax is sent)
University Email Address	Gerald.Fudge@etamu.edu
Preferred Form of Communication	Email
Communication Response Time	Typically within 12-48 hours on weekdays for email

COURSE INFORMATION

Class Meeting Schedule	See schedule at end of syllabus
Class Meeting Days & Classroom	01E: T/R 12:30 pm – 1:45 pm in AG/ET 211 02E: MWF 10:00 am – 10:50 am in AG/ET 211 03E: MW 12:15 pm – 1:30 pm in AG/ET 211
Textbooks Required	Schaum's Outlines, Probability and Statistics, 4th Edition (ISBN 978-0071795579)
Software Required	Microsoft Office, Python (open source; can use on school computers)
Optional Texts and/or Materials	

COURSE DESCRIPTION

This course covers the role of statistics in engineering, probability, discrete and continuous probability distributions, joint probability distributions, random sampling and data description, point estimation, statistical intervals. **Prerequisites**: MATH 192 or MATH 2414 or concurrent enrollment.

Upon successful completion of this course, students will demonstrate the following SLOs:

1 **Fundamental concepts**: Apply basic probability theory and statistics to
   - Analyze simple problems in probability
   - Compute and sketch the histogram; approximate the probability distribution function (PDF) with the histogram; interpret and write visualization code to show box plots, histograms, scatter plots, etc.
   - Describe discrete vs. continuous PDFs; describe data sample statistics vs. random variable statistics

2 **Probability density functions**: Translate word problems into appropriate PDFs and compute probabilities by hand and with tools for the below PDFs
   - Uniform
   - Gaussian / Normal, including Standard Normal
   - Exponential
   - Poisson
   - Bernoulli, including Bernoulli trials
   - Binomial
   - Geometric
   - Chi-square (compute probabilities using tools only)
   - t-distribution (approximate probabilities only)

3 **Calculations**: Translate word problems into equations and calculate for the below types of problems
   - Combinatorics probabilities
   - Bayes theorem probabilities
   - Process flow reliabilities
   - Markov chain probabilities
   - Sample statistics (mean, standard deviation (std), variance, median)
   - Random variable statistics (expected value / mean, std, variance)
   - Confidence intervals & z-scores (2-sided Gaussian confidence interval for mean given std)

4 **PDF Approximations**: Approximate PDF probabilities for the below cases
   - Poisson approximation to the binomial PDF
   - Normal approximation to the binomial PDF, t-distribution, and Poisson PDF

5 **Machine Learning (ML)**: Use Python ML and other statistical analysis tools to perform and interpret:
   - Sample feature selection, including and associated concepts of covariance and correlation
   - Regression (linear, quadratic, polynomial)
   - Clustering
   - Classification
   - Performance metrics, including recognizing and correcting for overfit and underfit

COURSE REQUIREMENTS

Minimal Technical Skills Needed

The prerequisites capture the minimum technical skills needed at the start of the class. Although programming experience is helpful, this is not required prior to starting the class.

INSTRUCTIONAL METHODS

The instructional methods in this course include lectures, class discussion and in-class participation, quizzes, homework assignments, exams, and a final project that integrates engineering skills by solving an engineering problem based on real-world data, and documenting the solution approach in a technical report. Since engineering probability and statistics applications can have a significant societal impact, and because these applications are often interdisciplinary, the class discussions will be broad-based, touching on many probability and statistics areas that can involve engineering, and we will use a number of real-world datasets.

STUDENT RESPONSIBILITIES AND TIPS FOR SUCCESS IN THE COURSE

1 Students are responsible for the following activities that will aid in success:
- o **Attendance & participation**: Attendance and participation required. Students are expected to let the instructor know if they are unable to attend on time. Students are expected to participate in class discussions and assignments. Participation & attendance is a graded component.
- o **Assignments**: Unless otherwise specified, all assignments are submitted to D2L. Late assignments will typically be penalized (20% for < 1 week; 10% extra each additional week until late penalty exceeds 50%, at which time the instructor may set the grade to zero; if too many submissions are late, then the late penalty may increase for subsequent late assignments as announced via email). Students are expected to notify the instructor and request an extension on any late assignment before the assignment is due (the instructor may reduce or totally waive the late penalty unless the instructor deems that there are too many extension requests, in which case extensions will not be granted for subsequent assignments as announced via email). Students are encouraged to correct and re-submit assignments (typically the instructor will assign a 10% re-submit penalty for each re-submit, however, for some assignments the re-submit penalty may be waived).
- o **Collaboration**: Students are expected to turn in their own work. However, students are also encouraged to collaborate with classmates and other students on all assignments. Students are expected to note any significant collaboration support within the assignment submission.
- o **Use of internet and artificial intelligence (AI) tools**: As with collaboration, students are expected to turn in their own work. However, most employers expect their engineers to know how to use AI tools appropriately to aid in report writing, code development, and design. Thus, students are encouraged to use AI tools to improve grammar and wording in the final report, and students will be shown how to use AI tools to support code development and problem solving, and will be allowed to use AI tools on selected assignments. The use of AI tools must, however, be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).
- o **Final project**: The instructor will assign final projects. Although the projects are team-based, students are expected to focus on different analysis aspects within each team, and students are expected to submit individual reports in PDF format using the required template properly and with specified file name conventions. Students are expected to collaborate with their teammates, but are also expected to do their own work.
- o **Quizzes**: Students are expected to take quizzes in a timely manner. Typically, no late penalty will be applied on quizzes, but if too many students are not taking the quizzes in a timely manner, then the instructor will apply late penalties to the quizzes as announced via email.

2 Additional tips for success include:
- o **Ask questions**: Do not get behind! Ask questions in class. Get help during office hours or by appointment. Keep up with the assignments. Let the professor know if you are having difficulty.
- o **Hand calculations and estimation**: Students should practice estimation as well as working simple problems by hand in order to reinforce conceptual understanding. In addition, these are critical engineering skills, especially when using complex tools, in order to validate correct tool use.
- o **Practice**: Learning requires practice; don't expect to learn just by watching the instructor or YouTube videos or your classmates. One effective practice technique for most students is to practice a set of exemplar problems until the problems and full solutions are memorized. Also, practice in front of other students, and keep in mind that making mistakes is a natural part of learning.
- o **Learning how to learn, how to collaborate, and how to use AI tools effectively**: Learning how to learn involves collaboration, reading, searching, and using powerful tools *while thinking critically*. Thus, students should think through what they are doing and experiment with learned techniques.

Final grades in this course will be based on the following scale:

A	B	C	D	F
100.00 – 90.00	89.99 – 80.00	79.99 – 70.00	69.99 – 60.00	<60.0

Overall grades will be based on a weighted average as shown below:

Assessment Type	Percent
Homework	40
Participation and Attendance	10
Exams	30
Quizzes	10
Final Project	10
Total	**100**

Note: There may also be opportunities for bonus points; these will be discussed in class.

COURSE OUTLINE / CALENDAR

Wk.	Days					Weekly Topic Plan	Notes	Assignment Plan	
	M	T	W	Th	F				
1	1/12	1/13	1/14	1/15	1/16	W1: Intro, histogram, probability, statistics		HW0: Syllabus	Q-1, Q-2
2	1/19	1/20	1/21	1/22	1/23	W2: Combinatorics, reliability		HW1: Probability	Q-3, Q-4
3	1/26	1/27	1/28	1/29	1/30	W3: Bayes theorem, random variables, PDFs		HW2: Combinatorics	Q-5
4	2/2	2/3	2/4	2/5	2/6	W4: Random variables, 4 PDFs, expectation		HW3: Discrete PDFs	
5	2/9	2/10	2/11	2/12	2/13	W5: Joint, marginal, conditional PDFs		HW4: Bayes, PDFs	Q-6
6	2/16	2/17	2/18	2/19	2/20	W6: Z-scores, confidence intervals, reliability		HW5: Working w/ PDFs	
7	2/23	2/24	2/25	2/26	2/27	W7: Applications, review		HW6: CIs, review	
8	3/2	3/3	3/4	3/5	3/6	W8: Review, midterm	**Midterm**		
9	3/9	3/10	3/11	3/12	3/13	**W9: Spring Break, no class**			
10	3/16	3/17	3/18	3/19	3/20	W10: Bernoulli, Binomial, Geometric PDFs			
11	3/23	3/24	3/25	3/26	3/27	W11: X-square, student-t PDFs; approximations		HW7: B,B,G PDFs	Q-7
12	3/30	3/31	4/1	4/2	4/3	W12: Project kick-off; Python data visualization	**Project start**	HW8: Final PDFs	
13	4/6	4/7	4/8	4/9	4/10	W13: Python clustering			Q-8
14	4/13	4/14	4/15	4/16	4/17	W14: Project time		HW9: Python data analysis	
15	4/20	4/21	4/22	4/23	4/24	W15: Final exam review			
16	4/27	4/28	4/29	4/30	5/1	W16: Wrap-up	**Projects due**		**Q-9**
						Final exam	**Final Exam**		

Notes:
1. The topic and assignment plans are notional, and may be revised by the instructor as needed to optimize learning.

LMS

All course sections offered by East Texas A&M University (ETAMU) have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

Zoom Video Conferencing Tool
https://inside.tamuc.edu/campuslife/CampusServices/CITESupportCenter/Zoom_Account.aspx?source=universalmenu

Access and Navigation

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a ETAMU campus open computer lab, etc.

COMMUNICATION AND SUPPORT

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:
https://community.brightspace.com/support/s/contactsupport

Interaction with Instructor

If you have any questions or are having difficulties with the course material, please contact your instructor. Correspondence will be through your university "myLeo" email, including emails from the instructor, whether direct or via D2L. Students are encouraged to check university email daily. You can ask questions during lectures or office hours. Students can also ask questions and make appointments outside of office hours via email.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail online in the Student Guidebook. Students should also consult the Rules of Netiquette Webpage for more information regarding how to interact with students in an online forum.

ETAMU Attendance

For more information about the attendance policy, please view the Attendance Webpage and the Class Attendance Policy

Academic Integrity

Students at East Texas A&M University are expected to maintain high standards of integrity and honesty in all their scholastic work. For more details and the definition of academic dishonesty see the following procedures:

> Undergraduate Academic Dishonesty University Procedure 13.99.99.R0.03
> Undergraduate Student Academic Dishonesty Form
> Graduate Student Academic Dishonesty University Procedure 13.99.99.R0.10
> Graduate Student Academic Dishonesty Form

Use of Artificial Intelligence

East Texas A&M University acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism).

Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

> East Texas A&M University
> Velma K. Waters Library Rm 162
> Phone (903) 886-5150 or (903) 886-5835
> Fax (903) 468-8148
> Email: studentdisabilityservices@etamu.edu
> Website: Office of Student Disability Services

Nondiscrimination Notice

East Texas A&M University will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information, or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in East Texas A&M University buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and ETAMU Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer. Pursuant to PC 46.035, the open carrying of handguns is prohibited on all East Texas A&M University campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

East Texas A&M Supports Students' Mental Health – Counseling Services

The Counseling Center at East Texas A&M University, located in the Halladay Building, Room 203, offers counseling services, educational programming, and connection to community resources for students. Students have 24/7 access to the Counseling Center's crisis assessment services by calling 903-886-5145. For more information regarding Counseling Center events and confidential services, please visit www.tamuc.edu/counsel

Mental Health and Well-Being

The university aims to provide students with essential knowledge and tools to understand and support mental health. As part of our commitment to your well-being, we offer access to Telus Health, a service available 24/7/365 via chat, phone, or webinar. Scan the QR code to download the app and explore the resources available to you for guidance and support whenever you need it.