

Course Information

Course Number:	ECEN 303
Course Title:	Random Signals and Systems
Section:	502
Time:	MWF 12:40pm-01:30pm
Location:	ZACH 241
Credit Hours:	3

Instructor Details

Instructor:	Yang Shen
Office:	WEB 215I
Phone:	(979)862-1694
E-Mail:	yshen@tamu.edu
Office Hours:	R 4:00pm-6:00pm Weekly virtual workshop F 4:15pm-5:15pm (Zoom link to be provided)

Course Description

Basic concepts of probability and its applications to engineering problems will be introduced in this course. The proposed treatment of subject includes set operations, probabilistic models, conditional probability and independence, total probability theorem and Bayes' rule, and notions of combinatorics. An important part of this course includes discussion of discrete and continuous random variables, common distributions, functions, and expectations. Many examples will be covered from science, engineering, and daily life. A tentative lecture-to-lecture outline is provided in Course Topics.

Course Prerequisites

Knowledge of sets, complex numbers, variables, functions, and college-level calculus.
Grade of C or better in MATH 251 or MATH 253; Grade of C or better in ECEN 248.

Course Learning Outcomes

It is not the ultimate objective of this course to have students memorize formulas and use them rigidly. Rather, we aim at having students

- “develop the ability to construct and analyze probabilistic models in a manner that combines intuitive understanding and mathematical precision” (See Preface of our textbook); and
- master the skills to address uncertainty and solve real-world problems in engineering and beyond.

Textbook and/or Resource Materials

Recommended Textbook:

- [BT] Dimitri Bertsekas and John Tsitsiklis. *Introduction to Probability* (2nd Edition). Athena Scientific, 2008.
- [CP] Jean-Francois Chamberland-Tremblay and Henry Pfister. *Undergraduate Probability I*. 2014. (Electronic copy will be shared on Canvas.)

Other Recommendations:

- Sheldon Ross. *A First Course in Probability* (9th Edition). Pearson, 2013.

Grading Policy

Weights towards final grades

- 15% Homework (About one assignment every two weeks and six in total)
- 5% Project
- 25% Midterm Exam 1
- 25% Midterm Exam 2
- 30% Final Exam

Computer programming can be involved in homework or project. No restriction on the choice of specific computer language.

Grading Scale

A	[90%, 100%]
B	[80%, 90%)
C	[70%, 80%)
D	[60%, 70%)
F	[0%, 60%)

Final grades will be determined numerically, solely based on individual standing, to reflect how well students do in assignments and exams. This approach is to ensure at least a fair mechanism to assess how well students learn course materials and accomplish course goals. Therefore, grades are very unlikely to change unless a mistake was made in grading or adding numbers. In such occasions, score adjustment can only be requested within a week after a graded assignment/exam is returned.

Late Work Policy

Late submission would incur a penalty of 10% each calendar day after the due time, up to a maximum of 7 calendar days. For instance, submissions late within 1 day of the due time receive 90% of their scores, those late 1-2 days receive 80%, and those late for > 7 days are not accepted.

Course Schedule

Tentative course topics

Lecture	Topic
1-3	Introduction and Mathematical Review
4-5	Basic Concepts about Probability
6-8	Equiprobable Outcomes and Counting
9-10	Conditional Probability
11-13	Total Probability Theorem and Bayes' Rule
14-15	Independence
16	Summary I
17-20	Discrete Random Variables
21-24	Discrete Random Vectors
25-29	Continuous Random Variables
30-33	Jointly Distributed Random Variables
34	Summary II
35-37	Limit Theorems
38-39	More Advanced Topics & More Real-World Applications

Important Dates (subject to change)

- Midterm Exam 1: Oct. 2, 2023 (M)
- Midterm Exam 2: Nov. 1, 2023 (W)
- Final Exam: Dec. 8, 2023 (F), 10:30am-12:30pm (University Schedule)

Suggestions on Study Habits

As the instructor I will do my best to help you understand course materials and accomplish course goals. To this end, we will design lectures (and weekly workshops, if applicable) to lead you through step by step and give homework assignments and exams to provide feedbacks on your progress. We will also use office hours, regular or on demand, to better understand and address your study needs.

Our support is in no place replacing your own efforts. Better study habits will make your efforts more effective toward accomplishing your goals. So here is a list of suggestions that we think you might find beneficial:

- ✓ **Read course materials prior to lectures** to at least have a sense about what will be covered next. *Weekly notes, partially typeset, will be posted on Canvas before the week starts.*
- ✓ **Attend lectures regularly and avoid absence.** (See more in Attendance and Make-up Policies). Missing a lecture or recitation would inevitably disrupt your step-by-step study plan that is carefully designed. In case of having to miss a lecture, ask the instructor and fellow students for related course materials, study them by yourself as soon as possible, and

ask questions that you might have during office hours. *All lectures will be recorded and shared.*

- ✓ **Do your homework and do it by yourself.** Each homework problem is a chance to apply new knowledge and hone new skills, not to mention that it is a chance to prepare for the exams and improve your scores. You are allowed to discuss about homework problems with other students when conceptualizing solutions. But you are expected to generate the written solutions, in scrap or final form, by yourself. *The use of existing solutions from any source (other students, past solutions, the internet etc.) is a violation of the Aggie Honor Code and is subject to the honor code penalties.*
- ✓ **Review materials and readings** covered in the preceding week and work on additional exercises on your own as needed. *Weekly notes, manually filled, will be posted on Canvas before the week ends. Additional exercises will be given in weekly virtual workshops.* And we are more than happy to help even more during office hours, regular or ad hoc requested.
- ✓ Use graded assignments and exams to **assess, adjust, and develop your own study habits.**

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor” ([Student Rule 7, Section 7.4.1](#)).

“The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence” ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University’s goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services \(CAPS\)](#).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University’s [Title IX webpage](#).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student’s academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus.

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the 988 Suicide & Crisis Lifeline (988) or at [988lifeline.org](https://www.988lifeline.org) [Links to an external site.](#)