

**Department of Electrical and Computer Engineering  
University of Massachusetts, Amherst**

**ECE 603: Probability and Random Processes  
Fall 2022**

**Instructors:**           **Hossein Pishro-Nik  
Saeede Enayati**

Email for all questions (**with ECE 603 in title**):

[umasscourse@gmail.com](mailto:umasscourse@gmail.com)

**TA(s):**                 Bo Guan [boguan@umass.edu](mailto:boguan@umass.edu)

Office Hours:

No-Quiz Weeks: Fridays, 9-10am, in the regular classroom (Integrated Learning Center S131).

Quiz Weeks: 10-11:30am, Marcus 220

Office hour zoom link (same times):

<https://umass-amherst.zoom.us/j/98664446056>

Ziyuan Zhou [ziyuanzhou@umass.edu](mailto:ziyuanzhou@umass.edu)

Office hour: Thursdays, 3:30pm to 4:30pm, Room 205 in Marcus Hall.

Office hour zoom link (same time):

<https://umass-amherst.zoom.us/j/98664446056>

**Course Website**       <https://umass.moonami.com/>

Please check course website regularly for announcements, etc.

**Course Format**       This course is a fully flexible course (<https://www.umass.edu/flex>). That is, students can choose to participate in-person or online. There is no advantage in terms of grading; however, participation in one of the formats is required.

To facilitate students' progress, all the needed materials for the course will be available on Moodle.

Students are responsible for watching the pre-recorded lectures available on Moodle each week

Live Lectures: Live lectures on Mondays and Wednesdays are dedicated to

- Reviewing course materials.

- Solving practice problems, including HW questions
- Answering students' questions
- Covering the material related to course mini projects

The live lecture time on Fridays are reserved for quizzes as well as project deadlines, no lecture will be given on those days (except for Friday Sept 9).

Students are responsible to submit assignments and projects by the given deadlines (Please see the schedule below).

There will be 6 quizzes, students have to take all quizzes during the provided window. Each quiz may be attempted twice during the designated window, and the highest grade will be considered. More information below.

**Zoom Link:  
(for live lectures)**

Available in Moodle

Please send a message to [umasscourse@gmail.com](mailto:umasscourse@gmail.com) if you like to request a live meeting.

**Catalog Data:**

Elementary probability theory including random variables, p.d.f., c.d.f., generating functions, law of large numbers, Elementary stochastic process theory including covariance and power spectral density. Markov processes and applications. Prerequisite: E&C-Eng 314 or equivalent.

**Topics to be covered:**

1. Basic concepts such as random experiments, probability axioms, conditional probability, law of total probability, Bayes' rule, and counting methods;
2. Single and multiple random variables (discrete, continuous, and mixed), as well as moment-generating functions, characteristics functions, random vectors, and inequalities;
3. Limit theorems and convergence;
4. Introduction to random processes, processing of random signals;
5. Poisson processes, discrete-time Markov chains, continuous-time Markov chains, and Brownian motion;
6. Basic methods of generating random variables and simulating probabilistic systems

**Prerequisites:**

An undergraduate-level course in probability (such as ECE 214)

**Textbook:**

Introduction to Probability, Statistics, and Random Processes, by Hossein Pishro-Nik. Available online at [www.ProbabilityCourse.com](http://www.ProbabilityCourse.com).

The digital version of the book is available for free. If you like to have the print version of the book, you can purchase it at Amazon (not required).

**Extra references (not required):**

1. Probability, Statistics, and Random Processes For Electrical Engineering, 3rd Edition, by Alberto Leon-Garcia, ISBN-13: 978-0131471221
2. Probability and random processes by John A. Gubner, ISBN: 978-0-521-86470-1
3. Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, 3rd Edition, by Roy D. Yates ISBN-13: 978-1118324561

<b>Grades:</b>	HW	20%
	Quizzes	50%
	Mini-Projects	30%

**HW:** Homework assignments with solutions will be provided on the course website; you need solve each problem before looking at the solutions. After solving each problem, you can look at the solutions. If your solution is correct write **“My solution was correct”**. If you had made a mistake, rewrite the correct solution **in your own words**. You do not lose points if your first solution was incorrect. Assignments must be uploaded before due date. Late submissions will not be accepted. You can either type the HW solutions or can write them on papers and upload the scanned version. In any case, you need to make sure your work is **clearly and neatly presented**.

**Quizzes:** There will be 6 quizzes please see the dates in the course calendar. The quiz problems will resemble the HW assignments and the lecture examples. Thus, if you do HWs appropriately and follow the lectures, the exams will be easy for you.

Quizzes will be available on Moodle. You can choose to take the quiz anytime between 8am and 8pm US Eastern Time and at your chosen location. Each quiz is one-hour long.

Each quiz may be attempted twice during the designated window, and the highest grade will be considered.

For those who prefer to take the quiz in class, you can come to class on the day of the quiz and start the quiz at 9am (always on Fridays). You might choose to do, for example, if you do not have access to a quiet place. However, you need to bring your laptop to class in this case.

You cannot consult with anyone during the quiz no matter where you are

taking the quiz. We place a very high value on integrity. Although, I'm quite sure such situation would not arise, I should emphasize that any dishonest behavior will result in an immediate F and reporting to the appropriate university offices.

**Mini-Projects:**

There are three projects in the course, all of which are designed in a way to help students learn practical skills related to the course. Project 1 is in an essay format. Projects 2 and 3 involve writing codes. The programming will be light, and students can use the language of their choice (MATLAB, R, Python, C++, Java etc.) Each project will be posted on Moodle. The material related to the project will be covered during the live lectures.

**Late Submissions:**

- Quizzes must be done within the assigned period.
- HW and Project assignments submitted by the deadline will be graded out of 100.
- HW and Project assignments submitted up to 48 hours late will be graded out of 70 (30% penalty).
- HW and Project assignments submitted more than 48 hours late will be graded out of 50 (50% penalty).

**Schedule:**

Slides	Assignments	Video Lectures
Chapter 1		Lecture 1
Chapter 1		Lecture 2
Chapter 1	HW#1 Due Date: Sep 14	Lecture 3
	Project 1 Due Date: Sept 16	
Chapter 2	HW#2 Due Date: Sep 21	Lecture 4
	Quiz 1 Sept 23 Length: One hour Window: 8am-8pm	
Chapter 3		Lecture 5
Chapter 3	HW#3 Due Date: Sep 28	Lecture 6
Chapter 4		Lecture 7

Chapter 4		Lecture 8
Chapter 4	HW#4 Due Date: Oct 5	Lecture 9
	Quiz 2 Oct 7 Length: One hour Window: 8am-8pm	
Chapter 5		Lecture 10
Chapter 5	HW#5 Due Date: Oct 12	Lecture 11
	Project 2 Due Date: Oct 14	
Chapter 5		Lecture 12
Chapter 5	HW#6 Due Date: Oct 19	Lecture 13
	Quiz 3 Oct 21 Length: One hour Window: 8am-8pm	
Chapter 6		Lecture 15
Chapter 6		Lecture 16
Chapter 6	HW#7 Due Date: Oct 26	Lecture 17
Chapter 7	HW#8 Due Date: Nov 2	Lecture 18
	Quiz 4 Nov 4 Length: One hour Window: 8am-8pm	
Chapter 10		Lecture 19
Chapter 10		Lecture 20
Chapter 10	HW#9 Due Date: Nov 16	Lecture 21
	Quiz 5 Nov 18 Length: One hour Window: 8am-8pm	
Chapter 11		Lecture 22
Chapter 11		Lecture 23
Chapter 11	HW#10 Due Date: Nov 30	Lecture 24

	Project 3 Due Date: Dec 2	
Chapter 11	HW#11 Due Date: Dec 7	Lecture 25
	Quiz 6 Dec 9 Length: One hour Window: 8am-8pm	

**Quiz Coverage: Note x-y means x, x+1, x+2, ..., y**

Quiz	Date	Book Chapters	Video Lectures	HW
Quiz 1	Fri Sept 23	1, 2	L1-L4	HW1, HW2
Quiz 2	Fri Oct 7	1-4	L1-L9	HW1-HW4
Quiz 3	Fri Oct 21	1-5	L1-L13	HW1-HW6
Quiz 4	Fri Nov 4	1-7	L1-L18	HW1-HW8
Quiz 5	Fri Nov 18	1-7 & 10	L1-L21	HW1-HW9
Quiz 6	Fri Dec 9	1-7 & 10,11	L1-L25	HW1-HW11

**Health and Wellbeing.** Success in this course and the College of Engineering depends heavily on your personal health and wellbeing. Recognize that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. I strongly encourage you to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak. **Please feel free to reach out to me about any difficulty you may be having that may impact your performance in your courses or campus life as soon as it occurs and before it becomes too overwhelming.** I encourage you to contact support services on campus that stand ready to assist you. Within the College, you may reach out to your academic advisor, the Office of Student Affairs (126 Marston) or the Office of Community Equity and Inclusion (128 Marcus). You can learn about the confidential mental health services available on campus by calling the Center for Counseling and Psychological Health (CCPH) at 413.545.2337 or visiting their website at [umass.edu/counseling](http://umass.edu/counseling). There are many other resources on campus for students facing personal, financial or life challenges to find support, stay in school, and graduate. See a comprehensive list at [umass.studentlife/single-stop](http://umass.studentlife/single-stop). Help is always available. Please reach out for support finding the resources you need.

**Disability Accommodation and Inclusive Learning Statement.** Your success in this class is important to me. We all learn differently and bring different strengths and needs to the class. The University of

Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a qualifying disability and require accommodations while participating in this course, please work with Disability Services to have an accommodation letter sent to me in a timely manner. If you have a disability but are not yet affiliated with Disability Services, please register with Disability Services (161 Whitmore Administration building; phone 413-545-0892). Information on services and materials for registering are also available on their website [www.umass.edu/disability](http://www.umass.edu/disability). If you are eligible for exam accommodations, your exams will be administered by the exam proctoring center. Contact Disability Services immediately, and comply with their exam scheduling policies, including the requirement that you book your exams at least seven days in advance of the exam date. *It is incumbent upon you contact me during the first few weeks of the semester, or shortly following registration with Disability Services, to ensure that your accommodations are being sufficiently met, including extra time and note-taking access, as applicable.* Finally, beyond disability accommodations, if there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

**Integrity.** There is no place for a dishonest engineer! Please read and be aware of the academic honesty policy: [http://www.umass.edu/dean\\_students/academic\\_policy](http://www.umass.edu/dean_students/academic_policy). While this isn't something that should arise, it is something we should be aware of and discuss as a class, as integrity is a core value of the engineering profession.

**Inclusivity:** The diversity of the participants of this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate with someone else in the College, speak with Assistant Dean Dr. Paula Rees ([rees@umass.edu](mailto:rees@umass.edu), 413.545.6324, 128b Marcus Hall). You may also submit anonymously through the College of Engineering Climate Concerns and Suggestions on-line form (<https://tinyurl.com/UMassEngineerClimate>) and/or the Positive and Negative Classroom Experience online form (<https://tinyurl.com/UMassEngineerClassroom>). We are all members of an academic community with a shared responsibility to cultivate a climate where all students/individuals are valued and where both they and their ideas are treated with respect.

**Pronouns and Names.** Everyone has the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on class rosters. Please let me know what name and pronouns I should use for you if they are not on the roster. A student's chosen name and pronouns are to be respected at all times in the classroom. To learn more, read the Intro Handout on Pronouns: [https://www.umass.edu/stonewall/sites/default/files/pronouns\\_intro.pdf](https://www.umass.edu/stonewall/sites/default/files/pronouns_intro.pdf)

**Title IX.** Any conduct that has the purpose or effect of unreasonably interfering with an individual's performance by creating an intimidating, hostile, or sexually offensive educational, academic, residential, or working environment is considered sexual harassment. Faculty have the responsibility to inform students of the resources and reporting options relevant to reporting an incident of sexual assault, sexual harassment, relationship violence or stalking for all genders. You may go to the Title IX webpage at <http://www.umass.edu/titleix/> and the Sexual & Relationship Violence Resource Guide at ([https://www.umass.edu/titleix/sites/default/files/documents/sexual\\_violence\\_resource\\_guidefall2019.pdf](https://www.umass.edu/titleix/sites/default/files/documents/sexual_violence_resource_guidefall2019.pdf)) to find more information about resources and reporting options. Please reach out to me if you would like assistance connecting with any of these resources/options. You may also contact William Brady, the Interim Title IX Coordinator by email at [wbrady@umass.edu](mailto:wbrady@umass.edu) or by phone at (413) 545-6204 if they have any questions or want to make a report, file a complaint, find out about resources and/or academic support.