

University of Massachusetts - Amherst  
Department of Electrical and Computer Engineering  
ECE 214 – Introduction to Probability and Statistics  
Winter 2020/2021 Syllabus

## DESCRIPTION

This course provides an elementary introduction to probability and statistics with applications. Topics include: probability space, conditional probability, Bayes theorem. Combinatorial analysis. Random variables (r.v.'s), distribution and density functions. Expected value, moments, characteristic function. Function of r.v.'s, Multiple r.v.'s, conditional distributions, independent r.v.'s. Multivariate Gaussian r.v.'s. Parameter estimation, regression, confidence intervals, hypothesis testing.

## INSTRUCTION TEAM

Instructor: Prof. Hossein Pishro-Nik, Marcus Hall 215K,

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

Please use only the above email address to communicate with the instructor.

Please do NOT use the messaging tool in blackboard.

In-Person Meeting: Appointments are available for students on campus on Wednesdays. Please send a message to the instructor to request a face-to-face meeting.

## PREREQUISITES

Calculus II

## COURSE FORMAT

The course is offered during 6 weeks, May 18, 2020-Jun 26, 2020. There are video lectures for each week. Lecture notes associated to the videos are available. There will be HWs every week. The HW assignment usually have two main parts to help students manage the work.

## TEXTBOOK

H. Pishro-Nik, "Introduction to Probability, Statistics, and Random Processes". The textbook is available for free at [www.probabilitycourse.com](http://www.probabilitycourse.com). Instructions and more supplemental materials will be available in Blackboard, <https://uma.umassonline.net/webapps/login/>

If you would like additional resources, here is a suggested textbook (not required):  
Yates and Goodman, Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, Wiley; 2 edition, 2004, ISBN: 0471272140

## GRADING

- Midterm Exam 1: 25% (Thursday May 28- Friday May 29)
- Midterm Exam 2: 25% (Thursday June 11- Friday June 12)
- Final Exam: 30% (Thursday June 25- Friday June 26)
- Homework assignments: 20%.

## HOMEWORK ASSIGNMENTS

Weekly Assignments:

There will be approximately 6 homework assignments (one every week) that will be posted Blackboard (log in at <https://uma.umassonline.net/webapps/login/>). Assignments must be uploaded before due date (usually Friday). 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.

It is encouraged to discuss the problem sets with others, but each student must turn in a unique personal write-up or code implementation. *Homework assignments are preparation for exams*, so do not rely too heavily on other students for help. Homework solution will be posted online after the due deadline.

Risk & Chance Course Assignments:

Each HW will include a very short questions regarding the Risk & Chance videos that are available on Blackboard. Answering these questions should not take more than 5 minutes every week.

## EXAMS

There will be three exams: two midterm exams and one final exam (dates mentioned above). Detailed instructions and information regarding each exam are provided in Blackboard.

**Note:** Due to the short length of the summer semester, there will be HW assignments every week, including the exam weeks. You need to plan ahead so that you have enough times to allocate to your HW assignments and exams, particularly during the exam weeks.

## TOPIC LIST

Topics covered:

(Chapters 1 and 2): basic concepts such as random experiments, probability axioms, conditional probability, law of total probability, Bayes' rule, and counting methods;

(Chapters 3 through 6): single and multiple random variables (discrete, continuous, and mixed), important distributions, functions of random variables, joint distributions, sum of random variables, moment-generating functions, random vectors, and inequalities;

(Chapter 7): law of large numbers and the central limit theorem;

(Chapters 8 and 9): Bayesian and classical statistical inference: Point and interval estimation, hypothesis testing, and linear regression.

## ACADEMIC HONESTY POLICY

It is expected that all students will abide by the Academic Honesty Policy, available at the Academic Honesty Office (Ombud's Office), or online at [http://www.umass.edu/dean\\_students/codeofconduct/acadhonesty/](http://www.umass.edu/dean_students/codeofconduct/acadhonesty/). Acts of academic dishonesty (such as taking or giving answers in an exam, use of extra crib sheets, submitting another person's work as your own, etc.) will result in a grade of F in the course, and possibly additional sanctions including being placed on probation or suspension for a period of time or being dismissed from the University. All students have the right of appeal through the Academic Honesty Board.

## ACCOMMODATION POLICY

The University of Massachusetts-Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological or learning disability on file with Disability Services (DS), Learning Disability Support Services (LDSS) or Psychological Disabilities Services (PDS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, **please notify me within the first week of the semester so that we may make appropriate arrangements.**