EE 520[1]
Random Processes

Instructor Information:

Instructor: John Lipor
E-mail: lipor@pdx.edu
Office: FAB 160-19
Office Hours: Monday, Wednesday 6:30 PM - 7:30 PM or by appointment
Course Website: `http://web.cecs.pdx.edu/~lipor/courses/520/`
Secondary Website: `http://gradescope.com`

Course Time and Location: Monday, Wednesday 4:40 PM - 6:30 PM, Location: FAB 150

Course Description: Review of probability, random variables, and expectation followed by a study of the principles and properties of random sequences and random processes. Topics include random vectors, fundamentals of estimation, modeling random sequences with linear systems, stationarity, Markov random sequences, and common random process models.

Prerequisite(s): Stat 351 and ECE 316, graduate standing or permission of instructor. Students will benefit from courses on linear algebra, undergraduate probability and random processes, and digital signal processing.

Credit Hours: 4

Required Text: This course will use a combination of instructor-provided lecture notes and the textbook *Probability and Random Processes for Electrical and Computer Engineers* by John A. Gubner. We will also utilize free textbook *Probability, Statistics, and Random Processes* by Hossein Pishro-Nik.

Recommended Texts and Resources:

- *A First Course in Probability*, Sheldon Ross

- *Probability and Random Processes*, Geoffrey Grimmett and David Stirzaker

- *An Exploration of Random Processes for Engineers*, Bruce Hajek,
  `http://www.ifp.illinois.edu/~hajek/Papers/randomprocJuly14.pdf`

- *An Introduction to Statistical Signal Processing*, Robert M. Gray and Lee D. Davidson,
  `https://ee.stanford.edu/~gray/sp.pdf`

---

[1]Template for this syllabus courtesy of Brian R. Hall, `http://www.brianrhall.net/rss/latexsyllabustemplate`.

Student Learning Outcomes:

- Understand what probability is and how to use probabilities to characterize random events

- Understand how to define a random variable and apply the definition to engineering problems

- Solve problems involving functions of random variables

- Know how the expectation of a random variable is defined and how to calculate it

- Solve engineering problems that involve random vectors

- Know how a random process is defined and the properties of random processes

Grade Distribution:

Assignments	40%
Midterm Exam	30%
Final Exam	30%

Grading Policy: Final grade cutoffs will be 90/80/70% or lower. Exam scores may be standardized.

Homework:

- Homework will be assigned weekly for most weeks. The problems will be posted each Friday to the course website and due the following Friday by 11:59 PM PT.

- Late homework assignments will not be accepted. Instead, the lowest homework score will be dropped.

- Homework will be submitted via Gradescope. Correct registration is required in order to earn homework points. Create an account on `https://gradescope.com`, use course entry code **KYJD8B**. Register with your PDX email, student ID, and use your given name and family name.

- Follow the instructions for scanning and submitting homework here.

- **Extra credit** will be given for homework typeset using LaTeX. The value of this credit is such that if all assignments are typed, students earn a 5% boost on the overall homework score.

- Homework assignments are to be completed on your own. You are allowed to consult with other students (and instructors) during the conceptualization of a solution, but all written work, whether in scrap or final form, is to be generated by you, working alone. Also, you are not allowed to use, or in any way derive advantage from, the existence of solutions prepared in prior years. Violation of this policy is an honor code violation. If you have questions about this policy, please contact me. While collaboration can sometimes be helpful to learning, if overused, it can inhibit the development of your problem solving skills.

- Students may not consult online answer forums such as StackExchange or use existing problem solutions found online.

- For coding problems, students are encouraged to help one another debug, but each student must write their own code. Copied code will receive a zero grade.

Exams:

- There will be one midterm exam and one final.

- You may use one 8.5 x 11 in handwritten note sheet for the first exam and two 8.5 x 11 in note sheets for the second exam.

- The midterm exam will tentatively take place on November 3 in class.

- The final exam will take place on December 6 from 5:30 PM - 7:20 PM.

Student Conduct: Students must abide by the Portland State University Code of Student Conduct, found at `https://www.pdx.edu/dos/codeofconduct`. Violations of this code will be handled according to procedure.

Access & Inclusion for Students with Disabilities: PSU values diversity and inclusion; we are committed to fostering mutual respect and full participation for all students. My goal is to create a learning environment that is equitable, usable, inclusive, and welcoming. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, drc@pdx.edu, https://www.pdx.edu/drc.

- If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and discuss your accommodations.

- Students who need accommodations for tests and quizzes are expected to schedule their tests to overlap with the time the class is taking the test.

- For information about emergency preparedness, please go to the Fire and Life Safety webpage (https://www.pdx.edu/environmental-health-safety/fire-and-life-safety) for information.

Title IX Reporting Obligations: As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. Please be aware that as a faculty member, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment, sexual violence or discrimination to a confidential employee who does not have this reporting responsibility, you can find a list of those individuals. For more information about Title IX please complete the required student module Creating a Safe Campus in your D2L.

Classroom Requirements for All Students and Faculty Due to COVID-19: The University has established rules and policies to make the return to the classroom as safe as possible. It is required for everyone to follow all the Return to Campus rules and policies. To participate in

this class, PSU requires students to comply with the following.

Masks Required at all Times in Classroom

- Wear a mask or face covering indoors at all times. Your mask or face covering must be properly worn (fully covering nose and mouth and tight fitting). Mesh masks, face shields, or face covering that incorporates a valve designed to facilitate easy exhalation are not acceptable. **Because a mask must be worn in the classroom, there should be no eating or drinking in the classroom.** If you have a medical condition or a disability that prevents you from wearing a mask or cloth face covering, you must obtain an accommodation from the Disability Resource Center (DRC) to be exempt from this requirement.

- CDC, State, and County guidance does not limit class size for in-person instruction or require physical distancing.

Vaccination

- Be vaccinated against COVID-19 and complete the COVID-19 vaccination attestation form. Those students with medical or nonmedical exemptions or who will not be on campus at all must complete the process described on "COVID-19 Vaccine Exemption Request Form" to establish those exemptions.

Health Check, Illness, Exposure or Positive Test for COVID-19

- Complete the required self-check for COVID-19 symptoms before coming to campus each day.

- If you are feeling sick or have been exposed to COVID-19, do not come to campus. Call SHAC to discuss your symptoms and situation (503.725.2800). They will advise you on testing, quarantine, and when you can return to campus.

- If you test positive for COVID-19, report your result to SHAC and do not come to campus. SHAC will advise you on quarantine, notification of close contacts and when you can return to campus.

- Please notify me, (i.e. your instructor), should you need to miss a class period for any of these reasons so that we can discuss strategies to support your learning during this time.

- If I become ill or need to quarantine during the term, either I or the department chair will notify you via PSU email about my absence and how course instruction will continue.

Failure to Comply with Any of these Rules

As the instructor of this course, the University has given me the authority to require your compliance with these policies. If you do not comply with these requirements, I may ask you to leave the classroom or I may need to cancel the class session entirely.

In addition, failure to comply with these requirements may result in a referral to the Office of the Dean of Student Life to consider charges under PSU's Code of Conduct. A student found to have violated a university rule (or rules) through the due process of student conduct might face disciplinary and educational sanctions (or consequences). For a complete list of sanctions, see Section 14 of the Student Code of Conduct & Responsibility.

Guidance May Change

Please note that the University rules, policies, and guidance may change at any time at the direction of the CDC, State, or County requirements. Please review the University's main COVID-19 Response webpage and look for emails from the University on these topics.