EE 278: Introduction to Statistical Signal Processing
Summer 2018 Session

Course Information

Instructor
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Office hours: Tuesday 2-4 PM
Packard 109

General Information
Course: EE 278, Introduction to Statistical Signal Processing
Lectures: Mondays & Wednesdays, 11:30am–1:20pm, Huang Engineering Center 18
Units: 3 units
Website: https://web.stanford.edu/class/ee278/

Check website for updated information regarding office hours, homework, exams, etc. Major announcements will be emailed. Office hours and an optional review session will be held each week. Office hours are intended to be a time for discussion about general class topics, homework, and review exercises.

For this quarter, the lectures will be live streamed. The live streams will be available on the course’s Canvas page, under BETA- Lecture Videos. They will also be made available on the same page 20 minutes after the lecture ends. Another way to access the lecture videos is through SCPD’s mvideox website. Lectures there will be posted 2 hours after each class.

Course Description
Review of basic probability and random variables. Random vectors and processes; convergence and limit theorems; IID, independent increment, Markov, and Gaussian random processes; stationary random processes; autocorrelation and power spectral density; mean square error estimation, detection, and linear estimation.

Prerequisites
EE178 or equivalent, linear systems and Fourier transforms at the level of EE102A,B or EE261, basic linear algebra, and familiarity with a language like MATLAB or Python to do some simulation exercises.

Recommended Texts
We will be using lecture notes posted online as our base reference for the course’s material. However, the following books may be useful as additional reading and should be on reserve at the Engineering Library:

▪ Leon-Garcia, Probability and Random Processes for Electrical Engineers.
▪ Papoulis, Probability, Random Variables and Stochastic Processes.
▪ H. Vincent Poor, An Introduction to Signal Detection and Estimation.

The following resources are also available online:

▪ B. Hajek, An Exploration of Random Processes for Engineers
  http://www.ifp.illinois.edu/~hajek/Papers/randomprocJuly14.pdf
▪ Gray and Davisson, An Introduction to Statistical Signal Processing

Course Requirements and Grading
Homework: There will be weekly homework sets.
Midterm: There will be an evening midterm exam approximately halfway through the quarter.
Final: There will be a final exam at the end of the quarter.
Grading guideline: 20% Homework, 35% Midterm, 45% Final
**Homework Submission**
Homework will be made available on Tuesdays and will be due the following Tuesday at 11:59pm sharp, unless otherwise stated. All students (on-campus and SCPD) should submit their homework electronically by uploading it through Gradescope. No late homework is accepted, but the lowest scoring homework will be dropped.

**Piazza**
The main mode of electronic communication between students and staff, as well as amongst students, will be through Piazza. It is intended for general questions about the course, clarifications about assignments, student questions to each other, discussions about material, and so on. We strongly encourage students to participate in discussion, ask and answer questions through this site.

**Collaboration**
You are encouraged to work on homework problems in study groups; however, you must always write up the solutions on your own, and you must never read or copy the solutions of other students. Similarly, you may use books or online resources to help solve homework problems, but you must always credit all such sources in your writeup and you must never copy material verbatim (see Honor Code).

**Students with Disabilities**
Students with Documented Disabilities: Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty. Unless the student has a temporary disability, Accommodation letters are issued for the entire academic year. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: https://oae.stanford.edu/).

**Course Outline**
The following topics will be covered in the course:

1. Review of basic probability and random variables
2. Random vectors and processes
3. Convergence and limit theorems
4. IID, independent increment, Markov, and Gaussian random processes
5. Stationary random processes
6. Autocorrelation and power spectral density
7. Mean square error estimation, detection, and linear estimation.