ECE 509 Signal Processing for Power Systems
(Fall 2019)

INSTRUCTOR   Dr. Liuqing Yang
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CLASS WEB SITE   RAMCT

CLASS MEETINGS   TR 2:00–3:15pm, Engineering B4

OFFICE HOURS   TR 10:00am–11:00am, Engineering B112

PREREQUISITES   Linear Systems Analysis (ECE 311/312 or equivalent)

TEXTBOOK

P. F. Ribeiro, C. A. Duque, P. M. da Silveira, and A. S. Cerqueira, **Power Systems Signal Processing for Smart Grids**, Wiley, 1st Edition, 2013, ISBN-10: 1119991501, ISBN-13: 978-1119991502.

COURSE OBJECTIVES

This course is intended to provide an introduction to signal processing tools for analyzing power systems. It is intended to address the needs of both students with some power engineering background and wish to acquire signal processing techniques for power system applications, and those with some signal & systems background and wish to extend the applications to power system analysis.

Upon completion of the course, students will be able to:

- Understand the fundamentals of signal processing applications in power systems;
- Identify typical waveforms in power system and their associated events; and
- Apply appropriate signal processing tools to analyze various power system measurements.

COURSE TOPICS

1. Introduction to signal processing in power systems
2. Review of basic phenomena and waveforms in power systems
3. Transducers and acquisition systems
4. Discrete transforms
5. Basic power systems signal processing
6. Multi-rate systems and sampling alterations
7. Estimation of electrical parameters
8. Spectral estimation
9. Time-frequency signal decompositions
10. Pattern recognition
11. Detection

GRADING

- 20% Homework, 40% Midterm exam, 40% Course project

- No extra work will be accepted for improving the final grade

COURSE POLICIES

Attendance: Regular attendance is strongly encouraged. Students are responsible for all assignments and announcements made in class, and all material covered in class, whether or not it is in the textbook. Students are personally responsible for all information disseminated during lectures, including homework assignments and due dates, exam dates, course material etc. Please check the class web site, and your colostate email account regularly for announcements and homework assignments.

Homework: Collaboration on homework is permitted unless explicitly prohibited, provided that: 1) collaboration is restricted to students currently in this class; 2) each student must have his/her own contribution and write up his/her homework independently; and 3) on problems involving programming, each student must independently implement every piece of the program(s). Direct copying of another student's solution will be considered plagiarism and a violation of the Student Conduct Code.

Midterm Exam: The exam will be closed-book and closed-note. But two (2) single-sided $8.5\text{in} \times 11\text{in}$ handwritten study sheets are allowed. Disputes in exam grading should be addressed in writing to the instructor within one week from the date the exam is returned to the class. Changes in the exam grade are solely at the discretion of the instructor.

Make-Up Policy: If, in the event of extraordinary circumstances, a student has to miss an exam, the student has to seek prior approval of the instructor with a legitimate excuse, accompanied by some documentation from either a medical doctor or an attorney. Notes from family members are not acceptable. Make-up exams will be arranged only for properly authorized absences.

Course Project: Each student is required to submit an initial proposal, a preliminary report and a final report (all in written form) for his/her individual project. Detailed guidelines will be provided.

Integrity and Honesty: Cheating of any kind is extremely serious and may result in an 'E' grade and other consequences. Please refer to the Student Conduct Code at *http://www.conflictresolution.colostate.edu/conduct-code.aspx*, and consult Conflict Resolution web sites *http://www.conflictresolution.colostate.edu/home.aspx* for the Academic Integrity guidelines and various policies.

ADA Statement: Students with disabilities are encouraged to register with the Office for Student Services to determine the appropriate classroom accommodations. Any student with verification of a disability should contact the instructor as soon as possible, and will be accommodated in an appropriate manner.