Catalog Description: Multi-rate digital filters: decimation and interpolation; Analytic signal generation and Hilbert transformers; basic Adaptive filtering; Random time-series; auto- and cross-correlation sequences and their generation; Wiener filters, matched filters; rational modeling of random sequences; parametric and non-parametric spectral estimation.

Prerequisites: ELEN5346 DSP.

Meetings: TR 11:10 – 12:30 Room 2631C

Instructor: Gleb V. Tcheslavski

Office hours: By appointment


Recommended books:


On-line access: The course syllabus, assignments, solutions, and supplementary materials will be available through http://www.ee.lamar.edu/gleb/adsp/index.htm.

Structure: Two 80-minute lectures per week. One project, one midterm exam, and the final examination in form of mandatory oral presentation.

Course Objectives and Student Learning Outcomes: Having successfully completed this course, the student will be able to:

- design efficient multirate filters (Criterion 3(a),(b),(c),(e),(h),(k));
- understand and implement concepts of analytical signal generators in form of Hilbert transformers (Criterion 3(a),(b),(c),(e),(h),(k));
- design basic adaptive filters (Criterion 3(a),(b),(c),(e),(h),(k));
- understand concepts of stochastic signal processing (Criterion 3(a),(b),(c),(e),(h),(k));
- understand and implement Wiener filters (Criterion 3(a),(b),(c),(e),(h),(k));
- implement non-parametric and parametric methods of spectral analysis (Criterion 3(a),(b),(c),(e),(h),(i),(k));
- communicate more efficiently and successfully (Criterion 3(a),(d),(g));
• develop and enhance engineering report writing skills (Criterion 3(a),(f),(g),(h),(k)).

One project related to these learning objectives will form an integral part of this capstone design course. This project will also give the students an appreciation of the difference between theoretical and implemented algorithms for signal processing. Individual oral presentations, on (part of) one of the project, will provide the student with a useful exercise in the succinct communication of project goals, methods, and results, as required often in industry.

IT IS YOUR RESPONSIBILITY TO ACHIEVE THE COURSE OBJECTIVES. IT IS AS MY TASK TO FACILITATE YOUR ACHIEVEMENT.

**Tests:** The MIDTERM (MT) will be closed book/notes. Your performance on the Project and the midterm exam will account for the bulk of your grade. The FINAL EXAM will be in form of mandatory oral presentation (OP).

**Final exam:** TBD (will be used for oral presentations)

**Grading Policy** Grades will be determined on the basis of overall performance on the midterm exam, the final exam in form of oral presentation, and the project, with the following tentative weights:

**Homework/Projects:** One project will be assigned for groups of students. One report per group is expected. Projects will utilize Matlab extensively and may include hardware-based experiments. Definitive project due dates will be stated on the assignment. No late reports will be accepted.

**Attendance policy:** Class attendance is mandatory with exception for medical and family emergencies.

**Special needs:** Students with special needs or circumstances (religious, conflicts, disabilities, etc.) are encouraged to meet with me during my office hours.

**Honor System:** Cultivate an ethical, professional attitude. Discussions on lecture subject material, to clarify your understanding, are highly encouraged. However, it is your personal/own understanding only that should be reflected in all work that you turn in. You may thus claim credit only for your own work. All graded work is covered by the Academic Honor Code; violations will be prosecuted that may lead to failing the course.

*Special Note on Honor System:* copying of any copyrighted materials (journal articles, book chapters, web pages etc. or their parts) is a violation of Honor Code! You may be allowed to use quotations (short excerpts from published or unpublished works) in your reports IFF the source of quotation is clearly identified.

Last updated: Dec. 8, 15