Utah State University
Department of Electrical and Computer Engineering
ECE 3640 - Discrete-time Signals & Systems

Syllabus

Course title	**ECE 3640 - Discrete-time Signals & Systems**
Instructor	Prof. Jake Gunther (jake.gunther@usu.edu) EL 149
Office hours	TBD
Textbook	Oppenheim & Schafer, "Discrete-time Signal Processing" (3rd Edition)
Prerequisites	ECE 3620 - Continuous-time Signals & Systems (ECE course flowcharts)
Class time	10:30 - 11:20 AM, Monday, Wednesday, Friday
Class location	ENGR 104
TA	Qun Wang (claudqunwang@gmail.com)

Course summary

This course is an introduction to digital signal processing (DSP). The main topics we cover in lectures are the DTFT[1], which we use to study sampling of continuous-time signals; the DFT[2], which we use to study spectral analysis of signals; and the z-transform, which we use for analysis and design of discrete-time systems.

Homework assignments

Homework assignments will be given approximately weekly and will be posted on the class web page. These assignments will involve traditional pencil-paper work and will also involve some Matlab computer programming.

Computer assignments

In the textbook and lectures we learn about signals and systems. Becuase there is a difference between knowing about and doing, the computer assignments are designed to give students experience *doing* digital signal processing on real signals using computers. These assignments should be done using the C/C++ programming language. Computer assignments will be given approximately biweekly.

Exams

Questions on exams may be taken from material covered in lectures, homework assignments, computer assignments, the textbook, or supplementary material discussed in class.

Grading

Item	Weight
Homework assignments	30%
Computer assignments	30%
Midterm exam	20%
Final exam	20%

Missed lectures

Students who miss lectures are responsible to find out what they missed from their classmates. The instructor will not repeat the lecture during office hours.

Late policy

Assignments will not be accepted late without prior instructor permission.

Cheating

Don't do it! Everything you turn in must represent your own thinking and work. The instructor reserves the right to fail any student who can be justifiably be accused of cheating.

The following is taken from the USU Academic Honesty and Integrity Policy.

> Each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity."
> Violations of the Academic Integrity Standard (academic violations) include, but are not limited to:
> *Cheating*: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity, including working in a group when the instructor has designated that

> the quiz, test, examination, or any other academic exercise or activity be done "individually"; (2) depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; (5) continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity; (6) submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or (7) engaging in any form of research fraud.
> *Falsification*: altering or fabricating any information or citation in an academic exercise or activity.
> *Plagiarism*: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

Disabilities

In cooperation with the Disability Resource Center, reasonable accommodation will be provided for qualified students with disabilities. Please meet with the instructor during the first week of class to make arrangements. Alternate format print materials (large print, audio, diskette or Braille) will be available through the Disability Resource Center.

Assessment

In the Fall semester of 2011, USU's Office of Analysis, Assessment and Accreditation (AAA) launched a new course evaluation system called IDEA. This system attempts to evaluate student progress on specific learning objectives selected by the instructor from the predefined list of twelve objectives listed below. I have selected the first three objectives for this course (highlighted in blue).

Three weeks before the end of the semester you will be sent a personal e-mail from the IDEA syste with a link to an on-line evlauation form with these questions. My goal is for students to make "exceptional progress" and "outstanding gains" in the three highlighted areas as they apply to communication systems.

This class is designed to help students (1) gain factual knowledge and (2) learn fundamental principles, generalizations and theories. Implmenting communication systems in the computer assignments is designed to help students (3) apply course materials.

Course objectives (IDEA)

1. Gaining factual knowledge (terminology, classifications, methods, trends)

2. Learning fundamental principles, generalizations, or theories
3. Learning to apply course material (to improve thinking, problem solving, and decisions)
4. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course
5. Acquiring skills in working with others as a member of a team
6. Developing creative capacities (writing, inventing, designing, performing in art, music, drama, etc.)
7. Gaining a broader understanding and appreciation of intellectual/cultural activity (music, science, literature, etc.)
8. Developing skill in expressing oneself orally or in writing
9. Learning how to find and use resources for answering questions or solving problems
10. Developing a clearer understanding of, and commitment to, personal values
11. Learning to analyze and critically evaluate ideas, arguments, and points of view
12. Acquiring an interest in learning more by asking questions and seeking answers

Course outcomes (ABET)

The electrical engineering program in the ECE department periodically seeks re-accreditation by ABET. As part of the accreditation process, each course in the program is built around a few fundamental course outcomes. Course outcomes are narrow statements that describe what students should know or be able to do by the end of the course. The course outcomes for this course are listed below.

1. Analytically compute forward and inverse transforms (analytical computation).
2. Program a computer to efficiently compute the output of LTI systems given the input and the impulse response (numerical computation).
3. Explain the relationship between continuous-time and sampled discrete-time signals in the time and frequency domains (signal analysis).
4. Design and apply filters to discrete-time signals (filter design).

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1. DTFT = discrete-time Fourier transform↩

2. DFT = discrete Fourier transform. This is really the same thing as the discrete-time Fourier series.↩