ECE 317
Digital Signal
Processing I (DSP I)

Lecture 1

Prof. Mojtaba Soltanalian

UIC

Topics of today's lecture

- ☐ Topics to be covered, DSP application areas

- ☐ Grading and other policies

- ☐ CT and DT signals

- ☐ Some applications

- ☐ DT signal representation, basic signals

Digital Signal Processing I Instructor Information

☐ Instructor:

Mojtaba Soltanalian,

Associate Professor, Dept. ECE

☐ Instructor coordinates:

Office: SEO 1031

Email: msol@uic.edu

☐ Instructor Office Hours:

Mon 11:00 AM-12:00 PM

Digital Signal Processing I
TA Information

- Teaching Assistant:

  - **Sayan Koley**
    - Email – skoley2@uic.edu
    - TA's Student Support hours:
      Mondays 1:00 PM-2:00 PM at SEL 4250

ECE 317 What is the course about?

- ☐ Discrete-time signals and systems

- ☐ Linear shift-invariant systems, impulse response, FIR and IIR filters, convolution

- ☐ Discrete-time Fourier transform, Discrete Fourier transform (DFT), z -transform

- ☐ Sampling Theorem

- ☐ Structures for realizing linear shift-invariant systems

- ☐ Design of FIR/IIR digital filters

- ☐ DFT and fast Fourier transform algorithm

ECE 317
Placement in curriculum

- Required course of EE major.

- Technical elective for CE and EP majors.

- Basic course in signal/image processing and AI areas.

- Counts as a fundamental course in the <u>Tracks</u> of

  1. Data Science and Engineering

     (Data Science and Artificial Intelligence)

  1. Signal Processing

Digital Signal Processing I Course Information

- Call Number: 11043

- Course Prerequisite: (Make sure you have it)

  Grade of C or better in ECE 310

- Lecture (138 SES): 10:00 AM – 10:50 AM MWF

- Lab (3264 SEL)

Digital Signal Processing I Blackboard

- ☐ Class Website: http://blackboard.uic.edu/
  - Follow links to login and access ECE 317 course site
  - Important to view it regularly and look at announcements
- ☐ Course Welcome
- ☐ Course Syllabus & Calendar
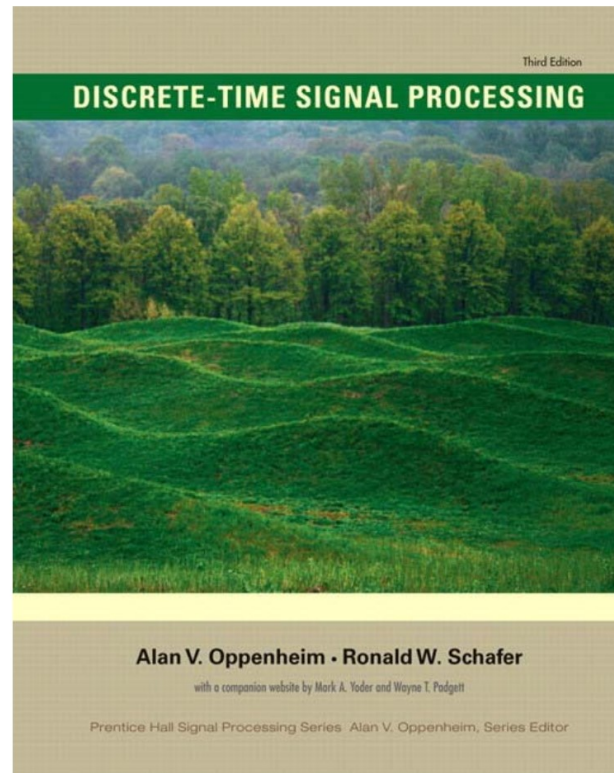- ☐ Other folders (Homework, Lab, Exam)

Digital Signal Processing I Class discussion

- ☐ Class discussion – important component of learning.

- ☐ Ask questions!

Digital Signal Processing I Textbook

A.V. Oppenheim, R.W. Schafer,
Discrete-Time Signal Processing,
Third Edition, Prentice Hall, 2010.

Digital Signal Processing I Grading policy

☐ Two exams (No make-up exams):

- ■ Mid-term Exam: 20%

- ■ Final Exam: 30%

- ■ A common "cheat sheet" will be provided. A copy of the official "cheat sheet" will be posted before an exam so that you know what information will be provided.

Digital Signal Processing I Grading policy

- Homework: 15%

  (due a week after it is assigned.)

- Project: 10%

- Lab: 25%

- Optional (10% Extra):

  Paper/Concept Presentation in the class.

  Must be pre-approved by the instructor.

Digital Signal Processing I Lab

- Lab exercises focus on important DSP operations and applications

- Lab report is due in week following lab

- Lab will begin in the **third week of the semester**

- Lab is MATLAB-based.

  - Available on university network and accessible by students.

Digital Signal Processing I: Professional & Ethical Responsibility

- ☐ Read announcements on Blackboard (Bb) regularly. View material and any notes posted on Bb.

- ☐ Attend all labs. Attendance will be recorded. Get TA signature after completing work.

- ☐ Take exams on scheduled dates. No make-up exams unless for reasons beyond a student's control and with supporting documents.

- ☐ Submit homework on time. No credit for homework submitted late.

Digital Signal Processing I: Professional & Ethical Responsibility

- **Religious holidays**: Notify instructor by the tenth day of the semester. We will try to honor the request.

- **Academic Honesty**: Dishonest conduct by students will result in appropriate disciplinary action. Intentional use or attempt to use unauthorized assistance, materials, information, or people in any examination or assignment may lead to penalties such as a failing grade. University guidelines will be followed.

Digital Signal Processing I: Some benefits of this course

- DSP finds applications in a large variety of problems in engineering and other fields.

  - Question: Where do we encounter DSP in everyday life?

  - https://www.youtube.com/watch?v=R90ciUoxcJU

- Prerequisite for advanced courses: ECE 417/418, courses in speech and image processing, medical imaging.

- Sampling of employers seeking employees with DSP knowledge:

  - Apple, Microsoft, Facebook, Google, IBM, Telecommunications companies like Qualcomm and Motorola, Defense-oriented companies like Northrop Grumman, Medical technology firms, Audio-focused companies like Shure, Bose

ABET student outcomes in ECE 317

Includes elements of most of the student outcomes below at least to some extent. Course has been identified for outcomes **1, 3, and 7**.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.