Introduction to DSP – Spring 2010

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Course Goals

• This is an introductory course on digital signal processing covering: Z Transform, sampling theory, filter design, discrete Fourier transform, and techniques for time domain and frequency domain analysis
General Information

- **Time:** 2EF5B
- **Place:** EE209
- **Textbook:**
- **References:**
  - Alan V. Oppenheim and Ronald W. Schafer, “Digital Signal Processing”
  - Prof. Yuan-Pei Lin’s course slides
- **Course slides:**
  - Slides will be put on website before class
  - Website will be noticed via email
Textbook

Digital Filters
and
Signal Processing
THIRD EDITION

with MATLAB® Exercises

Leland B. Jackson
Course Style and Grading

• Course style
  ▪ Slides with electronics tablet
  ▪ Some homeworks require the use of Matlab

• Grading
  ▪ Homework 20% (Turn in at the beginning of the class: half points will be deducted per one-day delay)
  ▪ Midterm I 25%
  ▪ Midterm II 25%
  ▪ Final 30%
TAs and Helps

• 霹靂博: 林普暄
  ▪ Course rehearsal
  ▪ Office hours: TBD

• TAs: 洪英哲 and 張瑞慶
  ▪ Homeworks and grading
  ▪ Office hours: TBD

• Office: 815
• Tel: 54472
Course Outline (1/3)

• Discrete-time signals and systems
  ▪ Discrete-time signals and sequences
  ▪ Discrete-time systems and filters
  ▪ Stability and Causality

• The z transform
  ▪ Inverse z transform
  ▪ Properties

• Input/Output relationship
  ▪ System function and frequency response
  ▪ Difference equations
  ▪ Geometric evaluations
Course Outline (2/3)

- Discrete-time networks
  - Flow graph properties
  - Network structures
  - Properties

- Sampling and Fourier analysis
  - DTFT
  - Properties
  - Sampling

- DFT
  - Properties
  - Zero padding
  - Windows in spectrum analysis
Course Outline (3/3)

- FFT
  - Decimation in frequency
  - Decimation in time
- IIR filter design
  - Classical filter design
  - Impulse-invariant transformation
  - Bilinear transformation
- FIR filter design
  - Filter design by windowing
  - Frequency-sampling technique
  - Equiripple designs
  - Maximumally-flat designs
Prerequisites

- Prerequisites
  - Signals and Systems