

EE710–4.0 Digital Signal Processing

Instructor: Kefu Xue, Ph. D., Dept. of EE, WSU

Winter 2008

Office: 425 Russ Center (phone: 775–5063)

Email: kefu.xue@wright.edu; **Web:** <http://www.cs.wright.edu/~kxue/>

Textbook: Digital Signal Processing, Principles, Algorithms, and Applications, 4th Edition, by John Proakis and Dimitris Manolakis from Prentice Hall.

Prerequisites: EE701 or equivalent (Topics: DFT, Sampling theory, Z-transform, Difference equation, Frequency response, LTI system, Linear and Circular convolution)

Description of the Course: Cellular telephone, high definition TV, speech synthesis and coding, image processing and compression, multimedia computing, digital communications, advanced medical imaging and testing equipment, digital instrumentation that are a few examples indicate the digital signal processing (DSP) has established itself as the essential technology in today's industries. The course will cover the fundamental discrete-time system theory as well as DSP applications and algorithms. Students will learn the topics listed as follows.

- Analysis of discrete-time systems and signals in frequency domain
- Implementation and applications of fast Fourier transform (FFT)
- Design and implementation of digital filters and algorithms
- Design and analysis of practical analog-to-digital and digital-to-analog conversion

The course will be centered around solving problems and working out computer assignments which are considered the most effective ways (nature learning) to learn DSP subjects.

Course Schedule:

1. (1st week) Introduction to digital signal processing, text book notation, and MATLAB. Reading assignments: Chapter 1; Suggested problems: 1.3, 1.5, 1.7, 1.8, 1.10, 1.11, 1.13, and 1.14 (due in 1c/2w(1st class of 2nd week)).
2. (2nd and 3rd weeks) Frequency domain analysis of discrete-time signals and systems. Reading assignments: Chapter 2, section 2.6; Chapter 4, section 4.2.7; Chapter 5, all sections. Suggested problems: 2.62, 2.63, 5.2, 5.7, 5.9, 5.11, 5.15, 5.24, 5.25, 5.28, 5.29, 5.32, 5.43, 5.52, 5.56, 5.65, 5.74, 5.77, and 5.78 (due 1c/4w). (Computer assignment I)
3. (4th and 5th weeks) DFT/FFT and its applications. Reading assignments: Chapter 7 (review), Sections 7.3; Chapter 8, Sections: 8.1, 8.2, 8.3.1. Suggested problems: 7.1, 7.2, 7.13, 7.17, 7.23 (a)(b)(e)(f), 7.25, 8.1, 8.4, 8.10, 8.11, 8.27 (due 1c/6w). (Computer assignment II)

4. (6th and 7th weeks) The Implementation of FIR and IIR digital filters. Reading assignments: Chapter 9, Sections 9.1 9.3, Chapter 12, Sections: 12.2 – 12.5. Suggested problems: 9.2, 9.4, 9.5, 9.11, 9.16, 9.17, 9.18, 9.23, 12.4, 12.7, 12.14. 12.18, 12.28 (due 1c/8w). (Computer assignment III & Computer assignment IV)
5. (8th and 9th weeks) FIR filter design methods, IIR filter design methods and frequency transformations. Reading assignments: Chapter 10, all sections. Suggested problems: 10.5, 10.6, 10.7, 10.14, 10.20 (due 1c/10w). (Computer assignment V)
6. (10th week)ADC and DAC. Reading assignments: Chapter 6. Suggested problems: 6.3, 6.5, 6.6 6.11 (due in the final week).

Grading policy:

- Quiz/Exam: 40 %
- Computer assignments: 55 %
- Home work 5%

**** If the total score is less than 50 %, the final grade will be F. ****

No make-up quiz will be given unless the student has received permission from the instructor prior to the quiz or experienced some emergency beyond his/her control!! The instructor is responsible to provide the first and second quiz score and the first computer assignment score as the feedback before the fifth week drop date.

Note: Office hours have been set in the following table (or by appointment) and the students are encouraged to make use of those to have their academic difficulties resolved.

Office Hours:

Mon.	Wed.
4:30 pm – 5:40 pm	4:30 pm – 5:40 pm

Calendar:

cls/wk	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Final
1st(Mon.)	1/7	1/14	N/C	1/28	2/4	2/11	2/18	2/25	3/3	3/10	8:00pm
2nd(Wed.)	1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/5	3/12	3/19