



King Saud University
College of Computer and Information Sciences
Department of Computer Engineering

CEN 543 – Digital Signal Processing (3-0-0), Masters Course

Semester II, Academic Year 2016-2017

Lecture Time: Sunday 8 – 10:30 AM

Course Description (catalog):

Discrete time signals, Z-transforms, discrete Fourier transforms (DFT), Fast Fourier transforms (FFT), design of finite impulse response filter (FIR) and Infinite impulse response filter (IIR), Adaptive filters, multirate signal processing, application on audio and image processing.

Textbook(s) and/or Other Required Materials:

Primary: Li Tan, *Digital Signal Processing: Fundamentals and Applications*, 2008, AP, Elsevier.

Supplementary: (1) Steven W. Smith, *The Scientist and Engineer's Guide to Digital Signal Processing*, 1997, California Technical Publishing., (2) A. V. Oppenheim and R. W. Schaffer, *Discrete-Time Signal Processing*, 1999, Prentice Hall, (3) Tamal Bose, *Digital Signal and Image Processing*, 2004, Wiley., (4) Lecture notes downloadable at <http://faculty.ksu.edu.sa/ghulam/Pages/CEN543.aspx>

Course Objectives: This course is designed to help the student:

- 1) Analyze signals using the discrete Fourier transform (DFT).
- 2) Implement DFTs using fast Fourier transform (FFT).
- 3) Apply DFT in speech and image signal processing.
- 4) Implement digital filters in a variety of forms.
- 5) Design of FIR filters using window method.
- 6) Determine stability of filters.
- 7) Analyze signals using Z-transform.
- 8) Perform multirate signal processing.

Topics covered and schedule in weeks:

• Statistics, probability, noise, analog-to-digital conversion	1
• Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT)	3
• Digital filters	3
• Discrete models of sampled data systems: Difference equations and z-Transform	2
• Multirate signal processing	2
• Applications to speech and image signal processing	2
• Review and evaluation	2

Assignment, Home works (HW), and paper presentation:

HW 1 Application of Fourier transform

HW 2 Application of filters

HW 3 Application of DSP in image processing

Project assignment: Students will be assigned to some particular projects. Students should implement, present, and write report for that project.

Important dates:

Midterm Exam: Sunday, March 26, 2017

Final Exam: Sunday, June 04, 2017

Project Submission: Tuesday, June 06, 2017

Evaluation:

Home Work	5%+5%+5%
Project Assignment	15%
Midterm Exam	30%
Final Exam	40%
Total	100%

Course Policies:

- **No late** homework submission will be accepted.
- Homework submission should be emailed to ghulam@ccis.edu.sa.
- There will be no relative grading.
- Students are encouraged to discuss homework problems but **not copy**.

Current Instructor:

Ghulam Muhammad, Ph.D.

Professor

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