**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 2017-2018**

 **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. Schafer , *Discrete-Time Signal Processing,* 1999, Prentice Hall, (3) Tamal Bose, *Digital Signal and Image* Processing, 2004, Wiley.

**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:**

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| --- | --- |
| Statistics, probability, noise, analog-to-digital conversion | 2 |
| Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) | 2 |
| 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
 | 1 |

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

 HW 1 Basic operations, 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 11, 2018

 Final Exam: Sunday, April 29, 2018

 Project Submission: Thursday, May 03, 2018

**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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Semester II, AY 2017-2018