**King Saud University**

**College of Computer and Information Sciences**

**Department of Computer Engineering**

1. Course number and name: **CEN352, Digital Signal Processing**

2. Credits and contact hours: **3 (3, 0, 1)**

3. Instructor’s or course coordinator’s name: Ghulam Muhammad

4. Text book, title, author, and year:

***Digital Signal Processing Fundamentals and Applications,*** L. Tan, 2008, Elsevier.

a. other supplemental materials:

*Signals and Systems,* Oppenheim A. and Willsky A. with S. Nawab, 2nd Ed., 1997, Prentice Hall.

*Digital Signal Processing. Principles, algorithms, and applications,* John G. Proakis and Dimitris G. Manolakis, 4th Ed., 2007, Prentice Hall.

5. Specific course information

a. Course description (catalog)

History and overview; sampling theorem, aliasing; sampled signals, periodic signals, non-periodic signals; impulse response and convolution; digital spectra analysis; discrete Fourier transform, fast Fourier transform; z-transform; digital filters, FIR and IIR filter design; windowing; effect of finite word length in digital signal processors; application in audio and image processing.

b. prerequisites or co-requisites: CEN340 (prerequisite).

c. Required, elective, or selected elective course: Required.

6. Specific goals for the course

a. Course Learning Outcomes: This course requires the student to demonstrate the following

1. Describe the sampling theorem and the spectra of a periodic signal.
2. Determine the spectrum of a signal using the DFT and the FFT.
3. Describe a system in z-transform domain.
4. Design and analyze digital filters that have specified frequency characteristics.
5. Apply windowing on a signal and explain how it improves transform properties.
6. Applications of digital signal processing in audio and image processing.

b. Relationship of Course to Student Outcomes

|  |  |  |
| --- | --- | --- |
| **Outcome** | **Student Outcome Description** | **Contribution** |
| (a) | an ability to apply knowledge of mathematics, science, and engineering | √ |
| (b) | an ability to design and conduct experiments, as well as to analyze and interpret data |  |
| (c) | an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability |  |
| (d) | an ability to function on multidisciplinary teams |  |
| (e) | an ability to identify, formulate, and solve engineering problems | √ |
| (f) | an understanding of professional and ethical responsibility |  |
| (g) | an ability to communicate effectively |  |
| (h) | the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context |  |
| (i) | a recognition of the need for, and an ability to engage in life-long learning | √ |
| (j) | a knowledge of contemporary issues |  |
| (k) | an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | √ |

7. Brief list of topics to be covered and schedule in weeks

Sampling theory, and periodicity 2

Fourier transform (DFT, FFT) 3

z-transform 2

Digital filters 3

Application: audio and image 3

Review and evaluation 2

8. Assessment Plan for the Course

Quizzes and Assignments 20%

Midterm Exams (2) 40%

Final Exam 40%

**Total 100%**

**Midterm exam dates:**

Midterm 1: Monday, October 26, 2015.

Midterm 2: Tuesday, November 30, 2015.

**Course Policies:**

* Cheating or plagiarism in any form will not be tolerated. A grade of zero will be registered for any infraction.
* **Attendance in the lecture is a must.** Students failed to achieve more than 75% attendance will be reported to the concerned authority; excuse should be directly submitted to the concerned authority; excuses of absence are accepted no later than one week of the absence.
* **All the exams are closed book.**

Contribution of Course to Meeting Curriculum Disciplines:

|  |  |
| --- | --- |
| **Curriculum Discipline** | **Percentage** |
| Mathematics and Basic Science | 30 |
| Engineering Science | 60 |
| Engineering Design | 10 |
| General Education |  |

Current Instructors, Department, Office Hours and Date:

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| Dr. Abdul Wadood Abdul Waheed  Department of Computer Engineering  Room 2210, Office phone: 4696280  Office Hours: Sun 10-12 AM and by appointments  Email: [aabdulwaheed@ksu.edu.sa](mailto:aabdulwaheed@ksu.edu.sa)  Webpage: <http://fac.ksu.edu.sa/aabdulwaheed/home> | Dr. Ghulam Muhammad  Department of Computer Engineering  Room 2191, Office phone: 4696281  Office Hours: Sun 10-12 AM and by appointments  Email: [ghulam@ksu.edu.sa](mailto:ghulam@ksu.edu.sa)  Webpage: <http://faculty.ksu.edu.sa/ghulam> |