1. **Course number and name:** ECE 4550: Digital Signal Processing

2. **Credits and contact hours:** 3 credits and 3 hours

3. **Course coordinator:** Ikhlas Abdel-Qader, Professor


5. **Course Information**
   a. Introduction to discrete-time signals and systems, Z Transform, Discrete Time Fourier Transform and DFT, Design and implementation of digital filters, Statistical methods, optimal filters, and error analysis.
   b. Prerequisites: ECE 3800.
   c. Elective for both program (Electrical and Computer Engineering)

6. **Specific goals for the course**
   a. specific outcomes of instruction
      [1] The student will understand the fundamental concepts of DSP theory such as sampling theory, discrete frequency, and Z –transform.
      [2] The student will develop an understanding of DTFT, DFT, and FFT.
      [3] The student will learn the concept of filtering, time-frequency methods and relations between them.
      [4] The student will learn FIR and IIR filters, their frequency response and characteristics.
      [5] The student will learn how to design and implement FIR and IIR filters using different methods, and how to test, analyze and refine design.
      [6] The student will complete and demonstrate a successful design and implementation of DSP filter using MATLAB assignments.
      [7] The student will learn to work in a team environment to complete research and computer assignments.
      [9] The student will learn how to search for specific information resources and write a report on the technical information on software and hardware, such as library, research and technical literature.
   b. ABET student outcome: This course contributes to the attainment of the following student learning outcomes a, b, c, e, g, i and k. ABET learning outcomes e and g are directly assessed in this course.

7. **Brief list of topics to be covered**
   – Course Introduction and Overview
   – Frequency Domain of DT Signals, The Z Transform, its properties, and Z-Inverse.
   – Fourier Transforms (DTFT & DFT), Discrete Transfer Function, Frequency Response.
   – Introduction to Digital Filters and review of Analog Filter Design
   – Design of FIR Digital Filters and design tradeoffs
   – Design of IIR Digital Filter
1. Course number and name ECE 4600 Communication Systems

2. Credits and contact hours 3 - 3

3. Instructor’s or course coordinator’s name R. Gejji

4. Text book, title, author, and year
   a. other supplemental materials

5. Specific course information
   a. brief description of the content of the course (catalog description) Introduction to
digital and analog communication systems. Design constraints of noise and
   bandwidth, comparison of various modulation techniques, and statistical methods.
   Information and channel capacity.
   b. prerequisites or co-requisites ECE 3800
   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course
   in the program Selected Elective

6. Specific goals for the course
   a. specific outcomes of instruction, ex. The student will be able to explain the
   significance of current research about a particular topic.
   Student will be able to: Analyze and design AM, FM and simple digital
   communication systems.
   b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other
   outcomes are addressed by the course. a,c,e,k

7. Brief list of topics to be covered
   Mathematical concepts in time and frequency domain, analysis, design and implementation
   of communication systems, e.g. AM, FM, digital.