Course name	**ECE 53800 Digital Signal Processing Applications**
Credit and contact hours	(3 cr.) Class 3
Course coordinator's name	Mohamed El-Sharkawy
Textbook	J. Proakis and D. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, 5th Ed., Prentice-Hall, 2009. ISBN 9780137348244
Course information	ECE 53800 Digital Signal Processing I (3 cr.) P: ECE 30100, ECE 30200 and ECE 36200 or Graduate Standing. Class 3. Theory and algorithms for processing of deterministic and stochastic signals. Topics include discrete signals, systems, transforms, linear filtering, fast Fourier transforms, nonlinear filtering, spectrum estimation, linear prediction, adaptive filtering, and array signal processing. **Prerequisites/ Co-Requisite** P: ECE 30100, 30200 and ECE 36200 **Required, Elective, or Selected Elective:** EE Elective, CE Elective
Goals for the course	Upon successful completion of the course, students should be able to 1. Describe the architecture, C and assembly programming of digital signal processors. [1] 2. Apply mathematical transforms such as FFT and DFT to signal processing problems. [1] 3. Select the appropriate filter type for the application. [1] 4. Apply systems concepts such as sampling, aliasing, and reconstruction to signal processing problems. [1] 5. Design digital filters to manipulate discrete parameter signals using signal processing algorithms and techniques. [6, 2] 6. Implement digital filters such as FIR, IIR, Subband, Multirate, and adaptive filters using digital signal processors.[1,2,6]
List of topics to be covered	1. Introduction to Digital Signal Processing and Digital Signal Processors. 2. Highlights of signals and systems, time and frequency domains. 3. Architecture, C and assembly programming of digital signal processors. 4. Sampling effects, aliasing and reconstruction. 5. Discrete Fourier Transform. 6. Fast Fourier Transform.

	7. Finite impulse response filters. 8. Infinite impulse response filters. 9. Adaptive Filter and Spectral Estimation. 10. Subband Filters and Multirate Systems. 11. DSP Applications. 12. Exams (2.0 classes and final exam period) **Laboratory Projects:** 1. Introduction to digital signal processing systems. 2. DSP development environment. 3. Analog input and output. 4. Finite impulse response filters. 5. Infinite impulse response filters. 6. Fourier transform. 7. Adaptive Filters. 8. Student projects.
Syllabi approved by	Mohamed. El-Sharkawy
Date of approval	12/9/2021