Course name	**ECE 56810 Design with Embedded and Digital Signal Processors**
Credit and contact hours	(3 cr.) Class 3
Course coordinator's name	Mohamed El-Sharkawy
Textbook	Mohamed El-Sharkawy, *Embedded and Digital Signal Processors Course Notes*. (With NXP's Application Group at Phoenix, Arizona)
Course information	ECE 56810 Design with Embedded and Digital Signal Processors. (3cr) P: ECE 36200 or graduate standing. This course provides an overview of the architectures, design considerations, features and applications of embedded processors with digital signal processing capabilities, single-core and multi-core digital signal processors (DSPs). The course emphasizes design consideration for embedded and DSP based real-time systems. Different applications such as internet of things, Voice over IP, wearable devices, medical instrumentation, machine to machine, smart homes and wireless systems will be considered. **Prerequisites/ Co-Requisite** ECE 36200 or graduate standing **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. Understand embedded systems, sensors and their practical applications. [1] 2. Design with sensors and sensor fusion systems. [1, 2, 1, 6] 3. Design embedded systems that demonstrate an understanding of the features, architecture, C library, peripherals, Ethernet, real-time operating systems, etc. [1, 2, 1, 6] 4. Design internet of things and/or wearable devices. [1, 2, 1, 6]

List of topics to be covered	1. Introduction to Embedded and Digital Signal Processing Systems and Applications. 2. Introduction to Applications such as Internet of Things, Wearable and Medical Devices, VoIP, Machine to Machine, Drones, Wireless, etc. 3. Sensors and Sensor Fusion. 4. Embedded Architectures and Processors. 5. Bootloaders and Cortex Microcontroller Software Interface Standard (CMSIS). 6. Designing using Peripherals of Embedded Systems. 7. Tools for Embedded Systems. 8. Embedded Systems with DSP Capability and Sensor Fusion. 9. DSP Applications with DSP CMSIS Software Library. 10. Designing using Embedded TCP/IP Stacks. 11. Designing of Internet of Things Systems. 12. Designing using Real Time Operating Systems. 13. Security for Embedded Systems. 14. Designing Wearable Devices. 15. Designing of Wireless Embedded Systems. 16. Labs, Projects, and Exams.
Syllabi approved by	Mohamed El-Sharkawy
Date of approval	12/10/2021