

<b>Course name</b>	<b>ECE 56810 Design with Embedded and Digital Signal Processors</b>
<b>Credit and contact hours</b>	(3 cr.) Class 3
<b>Course coordinator's name</b>	Mohamed El-Sharkawy
<b>Textbook</b>	Mohamed El-Sharkawy, <i>Embedded and Digital Signal Processors Course Notes</i> . (With NXP's Application Group at Phoenix, Arizona)
<b>Course information</b>	<p><b>2020-21 IUPUI Campus Bulletin description:</b></p> <p>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.</p> <p><b>Prerequisites/ Co-Requisite</b> ECE 36200 or graduate standing</p> <p><b>Required, Elective, or Selected Elective:</b> EE Elective, CE Elective</p>
<b>Goals for the course</b>	<p>Upon successful completion of the course, students should be able to</p> <ol style="list-style-type: none"> <li>1. Understand embedded systems, sensors and their practical applications. [1]</li> <li>2. Design with sensors and sensor fusion systems. [1, 2, 1, 6]</li> <li>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]</li> <li>4. Design internet of things and/or wearable devices. [1, 2, 1, 6]</li> </ol>

<b>List of topics to be covered</b>	<ol style="list-style-type: none"> <li>1. Introduction to Embedded and Digital Signal Processing Systems and Applications.</li> <li>2. Introduction to Applications such as Internet of Things, Wearable and Medical Devices, VoIP, Machine to Machine, Drones, Wireless, etc.</li> <li>3. Sensors and Sensor Fusion.</li> <li>4. Embedded Architectures and Processors.</li> <li>5. Bootloaders and Cortex Microcontroller Software Interface Standard (CMSIS).</li> <li>6. Designing using Peripherals of Embedded Systems.</li> <li>7. Tools for Embedded Systems.</li> <li>8. Embedded Systems with DSP Capability and Sensor Fusion.</li> <li>9. DSP Applications with DSP CMSIS Software Library.</li> <li>10. Designing using Embedded TCP/IP Stacks.</li> <li>11. Designing of Internet of Things Systems.</li> <li>12. Designing using Real Time Operating Systems.</li> <li>13. Security for Embedded Systems.</li> <li>14. Designing Wearable Devices.</li> <li>15. Designing of Wireless Embedded Systems.</li> <li>16. Labs, Projects, and Exams.</li> </ol>
<b>Syllabi approved by</b>	Mohamed El-Sharkawy
<b>Date of approval</b>	12/10/2021