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| **Course name** | **ECE 47100 Embedded Microcontroller, Microprocessor and DSP Based Systems** |
| **Credit and contact hours** | (3 cr.) Class 3 |
| **Course coordinator's name** | Stanley Chien |
| **Textbook** | ECE 471 Lecture Notes |
| **Course information** | ECE 47100 Embedded Microcontroller, Microprocessor, and DSP-Based Systems (3 cr.) P: ECE 36200 and ECE 26300. Class 3.<br><br>A structured approach to the development and integration of embedded microcontroller/microprocessor/DSP-based systems. The course provides students with design experience of embedded systems. The course covers the microprocessor selection, the configuration of peripheral components, and the hardware abstraction techniques. The course also covers the C programming techniques for embedded systems and using a fixed point microprocessor for floating point calculations.<br>**Prerequisites/ Co-Requisite**<br>P: ECE 26400 or equivalent, ECE 36200<br><br>**Required, Elective, or Selected Elective:**<br>EE Elective, Advanced CE Elective |
| **Goals for the course** | Upon successful completion of the course, students should be able to<br>1. Initialize and use various peripheral modules of a microcontroller. [2]<br>2. Write efficient C program for embedded systems. [2]<br>3. Explain the concept of real-time operating systems. [2]<br>4. Select the proper microcontroller, microprocessor, and DSP for specified industrial applications. [2, 6]<br>5. Design and implement the hardware and software of an embedded system. [1,2,6] |
| **List of topics to be covered** | 1. Introduction to embedded systems.<br>2. C language review - pointers and macros<br>3. Program development tools - compiler & linker, debugger & emulator<br>4. Makefile and integrated development environment<br>5. Systems and digital I/O configuration<br>6. Serial peripheral interface<br>7. Interrupts<br>8. A/D converter<br>9. Timers<br>10. Serial communication interface<br>11. Programming techniques – function pointers, callback functions, file inclusion in multi-module programs, conditional compilation<br>12. Building block development |

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| | 13. Debugging techniques<br>14. Timing considerations<br>15. Real-time operating systems<br>16. Floating point number computation on fixed point processors<br>17. Architecture and development environment of DSP<br>18. Compare microcontroller, microprocessor and DSP |
| **Syllabi approved by** | Stanley Chien |
| **Date of approval** | 12/04/2021 |