**University of Michigan-Dearborn Syllabus Template**

**ECE 372 - Introduction to Microprocessors ( 4 cr. hrs. )**

Prof. Paul C Richardson

**Office Location**: 206 ELB

**Phone Number**: 313 593-5560

**E-Mail**: richarpc@umich.edu

**Office Hours:** 915:1015, Mon and Wed, and by appt. Please feel free to contact me outside of office hours. Simple questions can be answered by email.

**Course Meeting Times and Location**: Monday, Wednesday: 8:00 – 9:15 AM, 175 ELB

**Course Description:**

Introduction to operation, interfacing, and applications of microcomputers and microprocessor-based systems. Assembly language programming, interrupts and interfacing. Three lecture hours and one three-hour laboratory per week.

**Program Goals / Student Outcomes:**

* **Program Educational Objectives**: <http://umdearborn.edu/cecs/ECE/data/programs/ee-objectives.pdf>
* **Student Outcomes**: <http://umdearborn.edu/cecs/ECE/data/programs/ee-outcomes.pdf>
* **Dearborn Discovery Core Goals:** <https://umdearborn.edu/696973/>

**Learning Goals (Student Outcomes) for ECE 372 (B, C, E, K)**

B. An ability to design and conduct experiments, as well as to analyze and interpret data

C. An ability to design a system, component, or process to meet desired needs

E. An ability to identify, formulate, and solve engineering problems

K. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

**Course objectives**:

1. Understanding Basic Principals of Microprocessor architecture to include MPU architecture, read/write operations, instruction cycle, memory maps, and ALU operations.
2. Understanding of Basic Microprocessor operations to include interrupt management, timer management, and I/O management.
3. Proficiency in using Code Warrior Integrated Development Environment (IDE) to assemble and compile code, download code to target processor, and perform testing on the code.
4. Proficiency in developing code for various tasks including managing interrupts, using timers, and using input/output module.

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| **Course Outcomes** | **Student Outcome** |
| Ability to understand how MPU computes arithmetic operations using two's compliments representation. | C |
| Ability to improve system reliability using MPU watch dog timer. | E |
| Ability to design code to handle an I/O event using interrupts . | C,E |
| Ability to design code to generate periodic events using timer subsystem. | C,E |
| Ability to develop, debug ,and demonstrate code to generate input/output | B,K |
| Ability to develop, debug and demonstrate code using interrupts. | B,K |
| Ability to develop, debug and demonstrate code using timers | B,K |

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| **Outcome Assessment** | **Assessment Tool** |
| Ability to understand how MPU computes arithmetic operations using two's compliments representation. | mid term, final exam |
| Ability to improve system reliability using MPU watch dog timer. | mid term, final exam |
| Ability to design code to handle an I/O event using interrupts . | mid term, final exam |
| Ability to design code to generate periodic events using timer subsystem. | mid term, final exam |
| Ability to develop, debug ,and demonstrate code to generate input/output | laboratory exercises |
| Ability to develop, debug and demonstrate code using interrupts. | laboratory exercises |
| Ability to develop, debug and demonstrate code using timers | laboratory exercises |

**Required Materials and/or Technology:**

**Textbook**:

* **primary:**  The HCS12 / 9S12: An Introduction to Software and Hardware Interfacing, 2nd Edition, Huang, Han-Way ( ISBN10: 1-4354-2742-4 or ISBN13: 978-1-4354-2742-6)
* **supplemental**: F. Cady, Software and Hardware Engineering- HCS12, Oxford, 2009

**Also required**: Dragon12-Plus2-DB evaluation board –see course description

**Laboratory Time and Location:**  Lab Instructor: Dr. Kaufman

* section 001 Friday 200-445pm
* section 002 Tuesday, 11-145pm

**Assignment and Grading Distribution:**

* Exams (mid term and final) 60%
* Labs and Lab quizzes and projects 25%
* Quizzes 15%

**Grading Scale:**

94%- 100% A 90%- 93% A-87%- 89% B+

84%- 86% B

80%- 83% B-77%-79% C+

74%-76% C

70%-73% C-

67%-69% D+

64%-66% D

60%-63% D

**Tentative Course Outline:**

* 0800 to 915 am in 175 ELB

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|  | **MON** | **topic** | **comments/ activities** |  | **WED** | **topic** | **comments/ activities** |
| Sep |  |  |  |  | **9** | welcome and intro | prereq test |
| **14** | intro |  |  | **16** | software development overview | start lab 1 |
| **21** | Microprocessor hardware | start HW 1 |  | **23** | Microprocessor hardware |  |
| **28** | ASM overview |  |  | **30** | development tools - linker/compiler | Start Lab 2 |
| Oct | **5** | instruction set | start HW 2 |  | **7** | instruction set | Quiz 1 |
| **12** | instruction set | start HW3 |  | **14** | instruction set | Start Lab 3 |
| **19** | instruction set |  |  | **21** | HCS12 example code | Quiz 2 |
| **26** | review |  |  | **28** | midterm | Start Lab 4 |
| Nov | **2** | Input/Output Module | start HW 4 |  | **4** | Input/Output Module | Quiz 3 |
| **9** | Input/Output Module |  |  | **11** | interrupts | Start Lab 5 |
| **16** | interrupts | start HW 5 |  | **18** | interrupts | Quiz 4 |
| **23** | interrupts |  |  | **25** | timers | Start Lab 6 |
| **30** | timers | Start HW 6 |  |  |  |  |
| Dec |  |  |  |  | **2** | timers |  |
| **7** | timers |  |  | **9** | Review | last day of class |
| **14** | Final Exam | 800-1100 am |  |  |  |  |

**Important Administrative Dates**

* Wed, Sept 9 Classes begin
* Tue, Sept 22: Registration ends, Last day to add, Last day to withdraw or drop with no penalty
* Tue, Oct 20: Last day to withdraw with "W" grade - 50% of tuition due and 100% of fees
* Tue, Nov 10: Last day to withdraw with "W" grade, 100% of tuition and fees due
* Thu-Sun, Nov 26-29 Thanksgiving recess
* Fri Dec 11 Classes end
* Sat, Dec 12 Study Day

**University Attendance Policy:** A student is expected to attend every class and laboratory for which he or she has registered. Each instructor may make known to the student his or her policy with respect to absences in the course. It is the student’s responsibility to be aware of this policy. The instructor makes the final decision to excuse or not to excuse an absence. An instructor is entitled to give a failing grade (E) for excessive absences or an Unofficial Drop (UE) for a student who stops attending class at some point during the semester.

**Academic Integrity Policy:** The University of Michigan-Dearborn values academic honesty and integrity. Each student has a responsibility to understand, accept, and comply with the University’s standards of academic conduct as set forth by the Code of Academic Conduct (http://umdearborn.edu/697817/), as well as policies established by each college. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offenses and violations can result in penalties up to and including expulsion from the University.

**Disability Statement:** The University will make reasonable accommodations for persons with documented disabilities. Students need to register with Disability Resource Services (DRS) every semester they are enrolled. DRS is located in Counseling & Support Services, 2157 UC (http://www.umd.umich.edu/cs\_disability/). To be assured of having services when they are needed, students should register no later than the end of the add/drop deadline of each term. If you have a disability that necessitates an accommodation or adjustment to the academic requirements stated in this syllabus, you must register with DRS as described above and notify your professor.

**Safety:** All students are strongly encouraged to register in the campus Emergency Alert System, for communications during an emergency. The following link includes information on registering as well as safety and emergency procedures information: <http://umemergencyalert.umd.umich.edu/> Finally, all students are also encouraged to program 911 and UM-Dearborn’s Public Safety phone number (313) 593-5333 into personal cell phones. In case of emergency, first dial 911 and then if the situation allows call UM-Dearborn Public Safety.