CS2230 Computer Organization & Assembly Language

Instructor: Colin MacCreery
Email: colin.c.maccreery@wmich.edu
Phone: (269) 276-3106
Office: B-257 CEAS

Catalog Description:
This course introduces concepts of computer architecture and assembly language. CISC and RISC instruction sets, along with associated hardware issues (e.g., data representation and instruction formats, instruction pipelining, register windows, context switching, and memory management) will be discussed. The student will program in both assembly language and the C programming language as well as interfacing the two languages.

Prerequisite: CS1110

Notes:
Enrollment is restricted to undergraduates and those graduate students admitted under the PCS (Permission to take Computer Science) classification. Enrollments in all 5000-level computer science classes will be restricted to undergraduates and graduate students in the Computer Science master’s program (CMP). Students in other graduate programs who need one of these courses either for subject matter or a research tool can gain admission by permission from the department.

Credits: 3 hours

Class Materials

Required Text:
The Manga Guide to Microcontrollers by Michio Shibuya

Optional, but helpful, texts:
Introduction to Microcontrollers by Günther Gridling, Bettina Weiss available at https://ti.tuwien.ac.at/ecs/teaching/courses/mclu/theory-material/Microcontroller.pdf

Development Kit:
You will be required to purchase an MSP430 kit for $30. These will be assembled, supported, and sold through the Computer Club, who will come to class one time. After that, you will need to get them at the Computer Club office (2225 Kohrman).
Course Learning Outcomes

Students will be able to...

• **define** terminology relevant to computing architecture such as “register file”, “interrupt”, “fetch-execute cycle” and “timer”.
• **demonstrate** mastery of conversion, addition and recognition of numbers in other base systems such as binary, octal and hexadecimal.
• **experiment** with the MSP430 microcontroller and peripherals to **examine** the relationship between different components present on all CPUs.
• **create** a design document that satisfies application requirements.
• **build** software in C and assembly that accomplishes assignment specifications.
• **use** a remote debugger to **analyze** a running program.
• **use** a terminal to navigate directories and execute programs.
• **discuss** with instructor the course timeline, assignment goals and exam concepts.

Grading

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<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>&gt;= 90%</td>
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<tr>
<td>BA</td>
<td>&gt;= 88%</td>
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<td>B</td>
<td>&gt;= 80%</td>
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<td>CB</td>
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<td>C</td>
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<td>DC</td>
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<td>D</td>
<td>&gt;= 60%</td>
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<td>E</td>
<td>&lt; 60%</td>
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The grading scale for this course is shown above. Note that the major letter grade categories are wider than normal, with smaller than normal half grade categories. Grades are weighted and the weighting is negotiable, but in general it is 40% **assignments**, 30% **final exam**, 20% **midterm** and 10% **quizzes**.

Course Etiquette

Please respect the learning opportunity for your classmates. Do not disrupt learning by being inattentive or disruptive in class. Please silence phones during the class period. If you need to work for other classes or personal business, don’t do it in this class. Take the time off if you need to do something more important than attending class. Attendance is not taken for a grade, but you are responsible for content you missed. Contact a classmate or your instructor.

If you think you may have difficulty meeting these or other academic requirements, please email your instructor as soon as possible before or immediately after the problem occurs. Contact your instructor if you will miss or be late for a class meeting, if you have material submission problems, miss or anticipate missing course deadlines, or have personal problems that affect your work in this class.
Academic Integrity

The following text is recommended by the Faculty Senate for all course syllabi, and it includes links to relevant information. Please make sure you are familiar with the university guidelines for academic integrity.

Students are responsible for making themselves aware of and understanding the University policies and procedures that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. The academic policies addressing Student Rights and Responsibilities can be found in the Undergraduate Catalog at http://catalog.wmich.edu/content.php?catoid=24&navoid=974 and the Graduate Catalog at http://catalog.wmich.edu/content.php?catoid=25&navoid=1030. If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s) and if you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.

Students and instructors are responsible for making themselves aware of and abiding by the “Western Michigan University Sexual and Gender-Based Harassment and Violence, Intimate Partner Violence, and Stalking Policy and Procedures” related to prohibited sexual misconduct under Title IX, the Clery Act and the Violence Against Women Act (VAWA) and Campus Safe. Under this policy, responsible employees (including instructors) are required to report claims of sexual misconduct to the Title IX Coordinator or designee (located in the Office of Institutional Equity). Responsible employees are not confidential resources. For a complete list of resources and more information about the policy see www.wmich.edu/sexualmisconduct.

In addition, students are encouraged to access the Code of Conduct, as well as resources and general academic policies on such issues as diversity, religious observance, and student disabilities:

- Office of Student Conduct www.wmich.edu/conduct
- Division of Student Affairs www.wmich.edu/students/diversity
- Registrar's Office http://www.wmich.edu/registrar/calendars/interfaith
- Disability Services for Students www.wmich.edu/disabilityservices

Students who take this class must be prepared to submit electronic copies of some or all assignments. The University expects that all students will be evaluated and graded on their own work. If you use language, data or ideas from other sources, published or unpublished, you must take care to acknowledge and properly cite those sources. Failure to do so constitutes plagiarism. Your work will be submitted to a plagiarism detection service called MOSS (Measure Of Software Similarity) which will reveal code that is similar in nature regardless of variable naming.

Throughout the term you will be required to solve problems. Solutions are to consist of your own work! Learning can certainly take place through discussions regarding assignments, and you may ask for hints or ideas; however, when discussion is occurring, the writing of assignment solutions should not take place during that discussion. You are to write your own solutions. Here are additional rules to follow, when writing your solutions that are to be submitted for a grade:

- Do not look at or copy material that someone else has written for the same or similar solution.
- Do not give your solution in part or whole, either in hardcopy or electronic form, to anyone else.
- Do not put yourself in a position of having access to another's files or work.
- Do not give another person access to your files or work.
Additional University Policies

Each of these federal statutes, policies and statements affirms that we aspire to be a community of academics and professionals who value the diverse perspectives and experiences each individual brings to WMU. These differences contribute to our rich and vibrant environment, where we strive to broaden our understanding of complex issues and gain new insights of the world. Although our perspectives, ideas and opinions may vary, each person is valued and treated respectfully.

Please refer to the University’s policy statement regarding Sexual and Gender-Based Harassment and Violence, Intimate Partner Violence, and Stalking Policy available from the following website: https://www.wmich.edu/sexualmisconduct

The Faculty Senate Religious Observances Policy is available from the following website: https://www.wmich.edu/facultysenate/downloads/MOA0702_religious_observances_final.pdf

The university is a place where your ideas will be challenged and offensive statements will be heard, but it is an equal opportunity forum for all. Mutual respect is the guiding principle: https://wmich.edu/sites/default/files/attachments/u370/2016/Civility%20Stmt.7-27-16_0.pdf

The civility statement affirms the value of each individual as a member of the university community. It further reminds us that ad hominem attacks directed towards the individual, rather than the position or idea, do not contribute to an environment allowing individuals to flourish. We should all work to keep our University the unique enterprise that defines its sense of community.