Computer Organization and Design (ECE 4680)

Fall 2015

Syllabus

M W 03:30PM - 05:20PM 09/02/15 - 12/22/15 2409 ENGG

Title: Computer Organization and Design Cr. 4 (LCT: 4)

WSU Catalog Description: Prereq: ECE 2610, 3620, and BE 2100. An introduction to computer organization and design. Instruction set design; basic processor implementation techniques; hardwired and microprogrammed control; performance analysis; memory hierarchy and cache design; pipelined processor design; I/O.

Coordinator: Dr. Nabil J. Sarhan, Associate Professor of Electrical & Computer Engineering.

Course Meeting Time: Monday and Wednesday during 03:30PM - 05:20PM

Course Meeting Location: 2409 ENGG.

Instructor:
  Name: Dr. Nabil J. Sarhan
  Office Hours: Monday and Wednesday 9:00 – 10:30 AM
  Office Location: 3109 Engineering Building
  Phone: (313) 577-2860
  Email: nabil@ece.eng.wayne.edu

Teaching Assistant:
  Name: Sina Gholamnejad Davani
  Office Hours: Thursday 3:00 - 5:00 PM
  Office Location: 3353 ENGG
  Phone: (313)577-1956
  E-mail: sina@wayne.edu

Course Homepage: You are responsible for all announcements on the course homepage on Blackboard.

Goals: To learn the organization, design, and performance analysis of modern microcomputer systems.

Learning Objectives: After completing this course, students should be able to do the following:
  1. Show and explain the organization of modern computer systems.
  2. Demonstrate how to assess the performance of computer systems using mathematical and statistical analysis.
  3. Describe and explain the techniques used by hardware designers to improve performance.
4. Write and test assembly language programs.
5. Develop and test hardware designs using Verilog Hardware Description Language.


Reference: none

Prerequisites by Topic: Introduction to Microcomputers (ECE 2620), Digital Logic Design (ECE 3610), Basic Engineering III: Probability and Statistics for Engineering Applications (BE 2100).

Corequisites by Topic: none

Topics:
- Introduction to Computer Systems and Performance Evaluation (Chapter 1)
- MIPS Instruction Set Architecture (Chapter 2)
- The Verilog Hardware Description Language
- Processor Design (Chapter 4)
- Memory Hierarchy and Design (Chapter 5)
- I/O (If time permits)

Course Structure: The class meets for two lectures a week. Three classes will be held in the lab during regular class time.

Computer Resources: Windows XP PCs and Sun Solaris Workstations running Cadence design tools and SPIM software.

Laboratory Resources: The laboratories contain PC and Linux workstations.

Laboratory Policy: There is absolutely no smoking: eating or drinking in any ECE instructional lab. These labs must be kept neat and each student is responsible for insuring that the equipment on his/her workbench is neatly arranged, that all the leads and other equipment are put away, and that there are no scraps of paper or other garbage left on or near his/her work station. Coats, briefcases: Knapsacks and other personal belongings are not permitted on or near the benches. These items must be kept on the coat rack near the door, not on the benches, window sills or the floor near the benches. The door to the lab must be kept locked at all times; unlocking or propping open the door at any time is expressly forbidden. Guests are not permitted in the lab at any time, and no one but the instructor may open the door to admit anyone after the class has begun. (For further laboratory policies, please look at the laboratory manual.)
Distribution of Points:

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<tr>
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<td>3 Labs</td>
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<td>Personal Info Page Assignment</td>
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<td>Topic Research Report</td>
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<td>Attendance and Participation</td>
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Grade Breakdown:

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Attendance: Every student is expected to attend all lectures.

Personal Information Page Assignment:

- **Deadline:** Wednesday, September 09 by 11:59 AM. No late submissions will be accepted.
- **Instructions:** Create your homepage on the ECE4680 Blackboard Page. Your homepage must include at least your full name, picture, the nickname (if any) you like to be called in the class, department, years at WSU, and the expected date of graduation.
- **Procedure:**
  1. From the ECE 4680 Blackboard Webpage, select Blogs and then select the student personal info blog.
  2. Create a new blog entry with your full name as the title and then include your personal info in the message box. The personal info must include at least your full name, nickname (if any), department, years at WSU, and the expected date of graduation.
  3. Attach a picture of yourself and hit the submit button.
  4. After creating the blog entry with your picture and info, go the "Personal Info Assignment" page and enter "I created a blog entry with my picture and required personal info" in the Assignment Materials Submission" page and then hit the "Submit" button.
5. **To verify your submission**, go to Grade Center and make sure that you have "!" under this assignment's column. This means that the assignment is submitted and awaiting grading.

**Exams:**

- Exam 1 will be scheduled based on the class progress and will be announced at least one week in advance.
- Exam 2 is scheduled for **Monday, December 14 during normal class time in the regular classroom**. You must let me know during the first week of classes if you have a conflict with another exam or you have exam overload.
- Do NOT assume that you will be able to take a makeup exam. Regardless of your circumstances, approval to take a makeup exam is up to the instructor.
- All exams are closed-book and closed-notes except for the data sheets included in the exam study guide. Do not write anything on these data sheets.
- Calculators that can store notes are NOT allowed.
- Flagrant cheating on an exam or a quiz will result in, at minimum, a failing grade for the course.

**Assignments, Labs, and Projects:**

- Assignments and projects will be posted on the course homepage.
- Labs will be scheduled during class time in one of the engineering computer labs. Labs cannot be made up under any circumstances.
- **Pre-lab** assignments must be completed prior to the corresponding lab sessions. Although nothing is due for pre-labs, they are greatly helpful in getting you ready for the labs.
- Assignments, labs, and projects must represent your original work. You must not look at other solutions or show your solutions to anyone else. At minimum, duplicate or very similar assignments will receive **negative grades**.
- Save all intermediate work until an assignment has been graded, returned and recorded. Keep the final source versions of your programs. Make frequent backups of your work. Never let anyone else use your account.
- All questions on grading must be brought to my attention within one week of the assignment's return.
- You are welcome to ask any questions with regard to the assignments after class or during office hours. You do NOT have to have an appointment to come to the office hours.
- **You should always start working on the assignments and projects as soon they are announced** even if they seem to be easy for you. You may run into unexpected problems which you may not be able to solve on your own when it is too late for you to ask for help.

**Late-Submission Policy:**

- All assignments and projects are officially due by the start of class on the due date.
- **Late assignments and projects will NOT be accepted.** The following excuses will NOT be approved for late submissions: computer crashes, disk crashes, accidental file deletions, lab computer unavailability, forgetting to print out the checklist and/or the output, printer problems, and the like.
• You are strongly encouraged to turn in the assignments in the class before the deadline to account for any unpredictable situations. You must always work ahead and make backups to account for unexpected problems.

Outcome Coverage:

(a) An ability to apply knowledge of mathematics, science, and engineering. The students must apply mathematics, computing, and engineering knowledge to solve problems related to hardware design and programming. The assignments, labs, and projects will require proper application of such knowledge.

(c) An ability to design a system, component, or process to meet desired needs. Students must design efficient hardware components that meet certain specifications and must write efficient assembly language programs that achieve practical tasks. This course focuses on the design aspects by including three labs and three projects.

(e) An ability to identify, formulate, and solve engineering problems. Projects and labs focus on the application of engineering concepts to typical design problems. The assignments will also require the students to solve real-life computer engineering problems.

(i) A recognition of the need for, and an ability to engage in life-long learning. Computer architecture is a rapidly evolving field, and students will be exposed in the lectures to the changes in architecture design over time.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. The students will utilize CAD tools for hardware design in the labs and projects. They will also use assembly language simulators for writing, debugging, and testing programs.

Religious Holidays (from the online Academic Calendar):

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:

(Edited statement from the SDS web site): If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with
you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

**Academic Dishonesty -- Plagiarism and Cheating**

(Edited statement from the DOSO’s web site): Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- **Cheating:** Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.
- **Fabrication:** Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.
- **Plagiarism:** To take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.
- **Other forms of academic misbehavior** include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

**Course Drops and Withdrawals:**

In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Pipeline. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week.
Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf).

**Student services**

The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit [www.success.wayne.edu](http://www.success.wayne.edu) for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

**Prepared By** Dr. Nabil J. Sarhan, Associate Professor of Electrical and Computer Engineering

**Last Revised:** September 1, 2015