

**INTRODUCTION TO COMPUTER ARCHITECTURE & ORGANIZATION**<http://www.ece.uc.edu/~paw/classes/ece326>

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- Catalog Data:** 20-260-326. *INTRODUCTION TO COMPUTER ARCHITECTURE & ORGANIZATION*. Fundamentals of computers. The stored program concept. Addressing modes, instruction formats, and instruction sets. Data path and control unit design. Hardwired and microprogrammed control. Memory components and the memory hierarchy. Pre-req: 20-260-235, 20-260-237. Winter/Spring: 4-4-6.
- Textbook:** V. C. Hamacher, Z. G. Vranesic, and S. G. Zaky, *Computer Organization*, 5<sup>th</sup> Edition, McGraw-Hill, 2002.
- Goals:** To give students an understanding of the basic organizational aspects of contemporary computer systems.
- Prerequisites:** Based number systems; number representations; boolean algebra; combinational and sequential logic design; and a working knowledge of at least one programming language.
- Course Outline:**
- | TOPICS   | CHAPTER |
|--|---------|
| 1. Introduction .....                          | 1       |
| 2. Operand addressing .....                    | 2       |
| 3. Instruction sequencing & Organization ..... | 2       |
| 4. Case Studies .....                          | 3, 11   |
| 5. Hardwired control .....                     | 7       |
| 6. Microprogrammed control .....               | 7       |
| 7. Input and output .....                      | 4       |
| 8. Memory systems .....                        | 5       |
| 9. Pipelining (if time permits) .....          | 8       |
- Computer Usage:** None required.
- Laboratory Projects:**
- Paper design of a hardwired control unit. Generally a 16 instruction single bus architecture with privileged instructions and timeout interrupts is constructed. (2 students/2 weeks)
  - Paper design of a microprogrammed control unit. Same instruction set as for hardwired control unit. Usually a multi-bus architecture configuration. (2 students/2 weeks)
- Abet category content:** Engineering science: 3 credits or 75%  
 Engineering design: 1 credits or 25%
- Grading:**
- |               |     |                   |     |
|---------------|-----|-------------------|-----|
| Exam I .....  | 10% | Projects I .....  | 25% |
| Exam II ..... | 20% | Projects II ..... | 15% |
| Final .....   | 30% |                   |     |

## Class Policies

- *Class Participation:* Classroom discussions are an extremely important component of this class. Involvement in class discussions *will* impact your grade. Questions are *encouraged* and expected. No question is too simple to be asked. I am usually willing to, occasionally, pursue topics in class that are somewhat tangential to the immediate lecture. Do yourself and your peers a favor — participate.
- *Class URL:* A web site for this class exists at <http://www.ece.uc.edu/~paw/classes/ece326>. You can find a copy of the syllabus, some class notes, project descriptions (after they're assigned), and copies of old exams/projects there. As is typical of web pages, this one is under construction. I will notify you throughout the term as I make changes to it.
- *Electronic Mail:* All students are encouraged to participate in electronic mail communication with me. I usually check my e-mail several times a day and this is probably the best and fastest way to obtain a response to your questions. My e-mail address is [philip.wilsey@uc.edu](mailto:philip.wilsey@uc.edu). Please keep your messages as brief as possible. Always include your name and e-mail address in the messages that you send to me.
- *Homework:* Homework will be regularly assigned, collected, reviewed, and returned to you. All homework and projects are due at the start of class that they are assigned (I will *not* accept homework after the lecture begins). Homework is to be an individual effort. Please feel free to discuss the general aspects of the problems among yourselves. However, when it comes time to apply answers to paper, please do your own work.
- *Projects:* There will be two projects of 100 points each. At your discretion, you can work on this project in teams of two individuals. It is solely your responsibility to form a team. The first project will require you to design a (gate level) hardwired control unit and data path for a small instruction set. The second project will require you to write a microprogram to implement the same instruction set. The first project will be assigned after we complete our discussions of Hardwired control (near the end of the 4th week) and it will be due two weeks later. The second project will be assigned after the first project is turned in and it will be due two weeks later. Late projects will *not* be accepted.
- *Exams:* The first exam will be scheduled one week after we complete hardwired control (sometime in the fourth week). The second exam will be scheduled approximately two weeks before the quarter ends. The final exam will be held at the regularly scheduled time.
- *Auditor/Pass-Fail:* Auditors will receive the T grade only if they earn the equivalent of a "C" grade in the course; otherwise you will receive a failing grade. Likewise, pass-fail students must also earn a grade of "C" to receive a passing grade.
- *Neatness:* All homework assignments and projects will be neatly prepared. Failure to turn in neatly prepared work will result in a loss of points. I reserve the right to assign a zero grade to any work that is not well prepared.
- *Cheating:* Unless otherwise designated, all assigned work will be individual efforts. Failure to perform your own work will constitute cheating and all cheaters will be failed. No exceptions, no withdrawals allowed.
- *Know Your Professor:* I have reserved tuesdays and thursdays for meeting students. Please take advantage of this time, get to know me. Stop in for discussions on computing, your studies, or your future plans. I'm available and am generally willing to engage in discussions on a variety of topics.