

Syllabus CS 413 (Sect. 2) Intro. to Digital Computer Architecture Spring 2017

Class Lecture Meeting Times: TR 5:30-6:50 pm (in OKT N 302).

Instructor: Dr. Tim Newman
email: tnewman@cs.uah.edu
Office: TH N 364
Phone: 824-6619

Office Hours: M 8:30-9:30am; 12:30-1:30pm
T 12:30-1:30pm
WR 9:30-11:00am

Prerequisite: CS (308 and) 309

Course Overall Aim: Examine the design of computer systems and subsystems, including register transfer, bus structure, timing and control. Focus includes pipelining, memory systems (including cache and cache coherence) and arithmetic and I/O units. Interrupt handling is also considered.

Supporting Aims: Achieve understanding of computer organization and architecture, enabling or furthering ability to analyze a problem and identify and define the computing requirements appropriate to its solution.

Students are also to be able to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

Lastly, students are to be able to recognize the need for, and have the ability to engage in, continued professional development.

Topics Addressed:

- Instruction Set Architectures - ARM; Data Access
- The Laws - Moore, Amdahl
- Performance Measurement
- Data Path, esp. RISC Register-Register Data Path
- Pipelining and Basic Instruction-Level Parallelism
- The Stores - Cache, Main Memory, Secondary Storage
- Processor-Level Parallelism

Text: *Computer Organization and Architecture: Themes and Variations* by A. Clements, 2014.

Grading: The final grade will be composed of the following weights. The instructor reserves the right to make changes to this system. Any changes will be announced in class.

| Activity | Total Points |
|--------------------|----------------|
| Mid-term Exams (2) | 200 pts. total |
| Final Exam | 125 pts. |
| Labs | 100 pts. |
| Homeworks | 20 pts. total |
| Participation | 20 pts. |
| Grand Total | 465 pts. |

The grading scale will be **no stricter than:**

| | | | |
|-------------------|------------|-------------------------|------------|
| At/Above 419 pts. | for a 4.0; | At/Above 373 pts. | for a 3.0; |
| At/Above 326 pts. | for a 2.0; | Above 309 pts. (>66.5%) | for a 1.0; |
| <= 309 | for a 0.0 | | |

This course will utilize the plus/minus grading system for final grades. Note that a plus or minus grade doesn't affect GPA (e.g., a B- is counted in GPA the same as a B or B+).

Exams: There will be two mid-term examinations, each worth 100 points. These exams are scheduled for **Thurs., Feb. 9** and **Thurs., Mar. 23**. The 125 point comprehensive final is at the time the University specifies, which is currently being listed as **Thurs., April 27**, from 6:30 pm to 9:00 pm. Tests will cover lectures, assigned readings, homework, and lab assignments. Documented crisis or one week's prior notice required for *consideration* of exam make-up.

Lab Assignments: There will be about 4 lab assignments in this course. Lab assignments will be completed in the Hardware Lab, which is Tech Hall N312. More detail will be provided about the lab assignments later/.

Homeworks: Some homeworks will be assigned. One could be due in the last two weeks of class. Homeworks are due at the start of class on the due date. No late homeworks are accepted. Homeworks are to be done on your own. Please do utilize the Help Desk TA's guidance if you need some guidance on homework problems.

Pop Quizzes: The instructor reserves the right to have a pop quiz. If there is a pop quiz, lecture, assigned readings, homework assignment topics, etc., are all fair game. If there are any pop quizzes, there will be a change to the total number of points possible in the course, and you will be notified of that at a class session.

Attendance and Absence: Class attendance and effective, constructive participation is important to your performance in the course and **makes up a portion of the grade**. The 20 participation points are based on the instructor's assessment of the **effectiveness and constructiveness** of your class participation, with that assessment made at the end of the course. Also note the exam absence policy mentioned earlier.

If you need help: I have scheduled a liberal amount of office hours and I want to help you learn the material and to succeed in the course. Please seek my assistance if you have any questions or concerns. The lab assistants in the Hardware Lab are also ready to help you with any difficulties you have on the assignments.

Academic Honesty: The University policy on academic honesty, discussed in the code of Student Conduct, is strict. The instructor's academic honesty policy is very strict; instances of academic dishonesty will be penalized, at least by failure on the item and usually by failure of the course (in addition to any University penalties). **Unless otherwise stated, all work is to be individual work.** Getting all or part of a homework or lab answer or program from a blog, forum, web answer sheet, library book, a friend, or any other source constitutes academic dishonesty; they are all example violations of the instructor's academic honest policy. So: **DO YOUR OWN WORK IN THIS COURSE.**

UAlert Emergency Notification System: UAHuntsville has implemented the UAlert emergency notification system. UAlert allows you to receive time-sensitive emergency messages in the form of e-mail, voice mail, and text messages.

Everyone who has a UAHuntsville e-mail address will receive emergency alerts to their campus e-mail address. In order to also receive text and voice message alerts, you are asked to provide up-to-date phone contact information. Participation in UAlert text and voice messaging is optional, but enrollment is strongly encouraged. You can't be reached through UAlert unless you participate. The information you supply is considered confidential and will not be shared or used for purposes other than emergency notification.

To review your UAlert account, add or update phone and alternate e-mail addresses, and set the priority for your contact methods, please visit the UAlert web site: <http://ualert.uah.edu>.

Class Policies Note: Please also see the Department's Course Policy Sheet.

Spring 2017 CS 413 (02) TR 5:30 Class Tentative Schedule

| Date | Topic | Reading Assignment | Special Comments |
|-----------------------------|---|-----------------------------------|------------------|
| Week One: 1/10 - 1/12 | Intro., ISA I: ARM | Ch. 3 | |
| Week Two: 1/17 - 1/19 | ISA I: ARM (cont'd) | Ch. 3 | |
| Week Three: 1/24 - 1/26 | ISA II: Data Access, RISC | Ch. 4 | |
| Week Four: 1/24 - 2/2 | ISA II: Data Access, RISC (cont'd) | Ch. 4 | |
| Week Five: 2/7 2/9 | Computer Technology - Moore's Law TEST 1 | Ch. 6.1 Chs. 3, 4, 6.1 | TEST 1 |
| Week Six: 2/14 - 2/16 | Amdahl's Law, Measuring Perf. | Ch. 6 | |
| Week Seven: 2/21 2/23 | Perf. Metrics (cont'd), Data Path Data Path, ILP: Pipelining | Chs. 6 + 7 Ch. 7 | |
| Week Eight: 2/28 - 3/1 | ILP: Pipelining (cont'd) | Ch. 7 | |
| Week Nine: 3/7 - 3/9 | ILP: Pipelining (cont'd) | Ch. 7 | |
| Week Ten: 3/14 - 3/16 | No Class | Review Ch. 6 + 7 | Spring Break |
| Week Eleven: 3/21 3/23 | ILP Wrap-Up + Cache TEST 2 | Ch. 7, 9.1 Ch. 6, 7, 9.1 | TEST 2 |
| Week Twelve: 3/28 - 3/30 | Cache (cont'd) | Ch. 9 | |
| Week Thirteen: 4/4 4/6 | Cache (cont'd) + Main Memory Main Memory (cont'd) | Chs. 9 + 10 Ch. 10 | |
| Week Fourteen: 4/11 4/13 | No Class Storage | Review Chs. 9 + 10 Ch. 10 + 11 | Honors Day |
| Week Fifteen: 4/18 4/20 | I/O I/O (cont'd) + Parallelism | Ch. 12 Chs. 12 + 13 | |
| Week Sixteen: 4/25 4/27 | Parallelism + Review FINAL | Ch. 13 Study all chaps. | FINAL |