

# **COMP 4300 Computer Architecture**

## **Fall 2010**

### **MWF 1:00-1:50pm, Shelby Building 1126**

### **Auburn University**

**Instructor:** [Dr. Xiao Qin](#)

Shelby Building 3101E, 844-6327  
Office hours: Wednesday 1:50-2:30pm

**TA:** Yun Tian, Yun Tian, tianyun@auburn.edu  
Office Hour: MW 9:00am-10:00am.  
Office: 2319 Shelby Center

### **Class Web Page**

Homeworks and announcements are posted on the class web page:  
<http://www.eng.auburn.edu/~xqin/courses/comp4300>

Handout, assignments, and important course information will be posted periodically on the class web page, which you have to regularly check.

### **Prerequisite**

COMP 3350 Computer Organization and Assembly Language Programming

### **Objectives**

This course aims to introduce many issues and challenges involved in designing and implementing modern computer systems. Since application developers definitely benefit from understanding how computer systems work, we will be focusing on the architecture and implementation of von Neumann computer systems. Understanding the interdependence of architectural and implementation decisions is of help to the development of applications where performance is a critical issue. Specific objectives of this course include:

- To learn the principles behind the design of modern computer systems
- To understand the design of instruction sets
- To learn pipelining techniques
- To understand issues in hierarchical memory system design
- To classify and describe parallel computer architectures
- To demonstrate the ability to program microprocessors in assembly language

## Textbook

Hennessy, J. L, and Patterson, D. A., *Computer Architecture: A Quantitative Approach, 4th Edition*. Morgan Kaufmann, 2007. ISBN-13 : 978-0-12-370490-0 ISBN-10 : 0-12-370490-1 (**Required**)

## Topics Covered

(These topics may change.)

- Principles of instruction set design
- Computer arithmetic
- Pipelining
- Memory hierarchy
- Autonomous I/O
- Quantitative characterizations of CPU
- Memory and I/O performance.

## Assessment

### Exams: Midterm Exam, Final Exam

Exams will be closed book, closed notes. Questions will be derived from lectures, material taught only in class, and from assignments. Question format will be mixed.

### Short Homeworks and Activities: 2-3 homeworks

These activities will be take-home in nature and designed to reinforce concepts taught in class. They will be due in writing at the beginning of class. An electronic copy may also be necessary (specified in the assignment). Generally, these assignments are designed to be low-risk in the sense that they are designed to assess thinking and effort, rather than to strictly punish errors.

### Individual Simulation Projects: 4 Lab Assignments

There will be four laboratory assignments. The lab assignment solutions will be submitted in C, C++, or java code. All projects should be made to compile under a compiler on Linux. You may use any development platform or compiler, but your projects will be graded **ONLY** on compilers running on Linux. If your project does not work in that environment, you will **NOT** get credit. Always test it yourself in the lab (Shop 3)!

## Getting Help

Assignments may prove challenging and time-consuming. You are always welcome to bring questions concerning labs to the class, as well as to office hours. A good strategy is to always start early on projects, so that if you run into difficulties, you can get help as soon as possible. I will do my best to answer e-mails concerning labs within 48 hours of receiving them; however, I do not guarantee that I will always have time to debug code via

e-mail (I prefer not to do so). For time-consuming problems dealing with code, office hours are always preferable. I will not help debug code via e-mail on the day an assignment is due. The Blackboard Discussion Board is a great way to ask questions so that everyone benefits from the answer to your question!

## Office Hours

MWF 1:50pm - 2:30pm. You are always welcome to drop by during office hours to discuss projects or general concepts. To get urgent help or advice out of office hours, it is recommended to send an email in advance to make an appointment.

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## Course Difficulty

Students are expected to read the appropriate sections of the book before each lecture. Typically, the course starts off relatively easy and gets harder as time goes on. Often, students are deceived by the (slower) initial pace and develop lazy habits at the beginning of the course. By mid-semester, they have thrown away many grade opportunities and find themselves in a bad situation with respect to grades. No amount of effort at the end of the class will compensate for consistent, dedicated effort throughout the class. My strongest recommendation is that you respect the class and come to class ready to engage every single class period. If you do this, you will dramatically increase your chances of success.

## Attendance

Class attendance is mandatory. This is an important undergraduate class; therefore, students will have to actively participate in class. It is believed that if you miss many classes (more than 6), there is a strong likelihood that you will not pass the class. Please notify me in advance if you will attend conferences, research meetings, or the like.

## Exams and Grading

Mid-term	20%
Final Exam	20%
Quizzes	15%
Written Assignments	15%
Lab Assignments	30%

## Scale

Letter grades will be awarded based on the following scale. This scale may be adjusted upwards if it is necessary based on final grades.

A [90, 100], B [80,90), C [70,80), D [60,70), F [0,60)

**Note:** In order to pass the class, you must receive at least 60% credit on the Individual Projects and Homework, regardless of performance on exams.

## Reading

Students are expected to read the appropriate sections of the book before each lecture.

## Assignments

There will be four written assignments and four laboratory assignments. The lab assignment solutions will be submitted in C or java code.

## Project Due Dates

Projects will be submitted through Blackboard. Projects will always be due at 11:55 pm on the due date. Late assignments will receive a grade of zero (0) Deadlines will be made as generous as possible to a priori take into account illness, other courses, Acts of God, and nearly all conceivable excuses. If you have a documented illness preventing you from completing your assignment, you may submit all of your partial work and request an extension. This extension is not automatic.

## Academic Integrity

Students will be expected to understand and follow Academic Honesty policies in place by the university. All work is to be done individually. Students should NOT share any project code or even detailed algorithm information with each other. Your programming code is exclusive to you.

## Special Accommodations

A student in need of special accommodations must bring that need to my attention within the first two weeks of class. The need must be properly documented.

## Study Hints

- Ask questions in class.
- At the first sign of difficulty, talk to your instructor and teaching assistant.
- Form a study group and meet regularly.
- Construct chapter summaries noting concepts, definitions, & procedures.