San Diego State University  
Department of Computer Science  

Syllabus:  
CS 370 (Section 1) Computer Architecture Fall 2016  

Class Web Page:  
The class web page is located at http://www-rohan.sdsu.edu/~taoxie/cs370. This page contains course announcements, syllabus, and other information.  

Class Location and Time:  
M – 120; Class Schedule: MW 16:00 – 17:15  

Instructor:  
Tao Xie, Ph.D.  
Office hours: MW 11:00 am-12:00pm or by appointment  
URL: http://www-rohan.sdsu.edu/~taoxie/  

Course Description:  
Logic gates, combinational circuits, sequential circuits, memory and bus system, control unit, CPU, exception processing, traps and interrupts, input-output and communication, reduced instruction set computers, use of simulators for analysis and design of computer circuits, and traps/interrupts.  

Textbook:  

Learning Outcomes:  
1. To learn fundamentals of digital systems analysis and design.  
2. To become familiar with components and functional units used in digital computers.  
3. To obtain a rudimentary understanding of computer organization and architecture.  
4. To acquire some knowledge of the PC hardware and associated peripherals.  

Prerequisites:  
2. Assembly Language Knowledge of the MC68000 assembly language.  

Course Topics* and Allocated Time:  
1. Introduction (1/2 week)  
About the subject, Levels of abstraction of digital systems (transistor, gate, register, processor). Design and analysis of digital systems. CAD tools  

2. Data types and representation (1 week)  
Binary coding and conversions between different number systems. Ones, two's complement, sign magnitude representation. Adding, subtracting and multiplication of binary numbers. Fixed and floating-point representation. Error detection and correction (cube representation of binary strings, Hamming code)  

3. Boolean algebra and logic design (2 weeks)  
4. Simplification of Boolean functions (1&1/2 weeks)
Karnaugh maps (1,2,3, 4 and 5 –variable maps). Selection of prime implicants. Don't care conditions.
Technology mapping for gate arrays (standard to NANMD/NOR schemes, standard to gate arrays. Timing
issues. Static and dynamic hazard.

5. Combinational circuit analysis and design (2 weeks)
(including barrel shifters). ROM. Programmable logic arrays. Full adder with ROM, PLA

6. Sequential circuit analysis and design (2 weeks)
triggered FF. FF types (SR, JK, D, T). Design of sequential circuits (analysis and synthesis with state

7. Memory organization (1 week)
Simple RAM (coincident decoding). Array of RAM chips (extending the address space and the word size).
Push-down stack. FIFO queue. Memory timing . Implementation of error detection and correction. ROM.

8. Processor (2 weeks)
Register transfer micro operations . Register transfer language. Arithmetic micro operations. Logic micro

* Topics OUT of Chapter 1 to Chapter 10 will NOT be included in our assignments and exams.

Evaluation:
1. Midterm Exam One 75-minute close book & in class ...20%
2. Midterm Exam Two 75-minute close book & in class ...20%
3. Homework assignment1 ~ Homework assignment3 ...15% (5% each)
4. Lab assignment1 ~ Lab assignment3 ...20% (Lab1 5%; Lab2 10%; Lab3 10%)
5. Final exam ...20%
6. Weekly exercises* ...0%
* Each weekly exercise consists of several questions and will be given to you every week. These weekly
exercises will NOT be graded and will contribute ZERO to your final grade. However, they will make you
feel comfortable when you take tests and final exam. Solutions to these exercises will be posted on our
class web page and you are highly recommended to self-evaluate your weekly exercises.

Relationship to Other Courses:
This course is the first course in a series of courses in computer architecture. It prepares you for courses
such as CS570 (Operating systems), CS572 (Microprocessor Architecture), and CS674 (Advance Computer
Architecture).

Class Guidelines:
• Prerequisite: The prerequisite for this course is CS237. This prerequisite will be strictly enforced.
  All registered students are required to bring me the proof of having passed CS237, or an
  equivalent course. Those who fail to provide this proof will be given a grade of “F” in the class.
• There will be NO make-up tests without a verified excuse.
• I will not sign late drop slips! By enrolling in this course, you are making a commitment to finish it. If there is any uncertainty about your future enrolment status beyond February 4, 2014, you should drop the course now. By staying in class and dropping out later, you are taking away a seat from the many people who need to crash the class this semester in order to graduate this year.

• The final exam is scheduled in the Final Exams Week. Failure to appear for the final exam at the indicated date and time will result in a grade of “F” in the course, unless you make prior arrangements with me for an Incomplete (see the requirements for receiving and Incomplete below). If you cannot attend the final exam for any reason (conflict with another course, work schedule, etc.), you should drop this class now. No make-up final exam will be given.

• Incompletes: To receive a grade of Incomplete (“I”) in this class, you must meet all of the following criteria: a. You must have extenuating circumstances beyond your control for not completing the course, and I will be the sole judge as to whether the circumstances warrant withdrawal from the class. Official verification is required to corroborate your circumstances. b. You must have completed both midterms and at least four assignments. c. You must have a grade of “C” or better in all coursework completed thus far. Note that this means a C or better in every test and every assignment.

• There will be NO extra credit in any assignments, tests, and final exam.

• All homeworks are due at the start of class on the indicated due day. If you cannot make it to the class, please ask your friend to bring it at the start of class. No late homework will be accepted.

• All the exams are close-book, close-notes. You can only bring one piece of paper (size A4) as “cheating sheet” for each of the three exams. Note that NO solutions to ANY questions including homework and text example questions are allowed on your “cheating sheet”!

• Any questions about grading must be brought to the attention of the grader or the instructor within one week after the item in question is returned. Your request must include a short written statement describing your question or concern.

• No cell phones, No Pagers, No speaking in class.

• Cheating: Anyone caught cheating/collaborating on an exam or any assignment will receive zero for that assignment or exam. If a student is caught twice, he/she will receive an F in the course and the incident will be reported to the Office of Judicial Affairs for disciplinary proceedings. Note: If, for instance, you allow your assignment be copied by a classmate, you are considered as guilty as the copier.

For Students with Disabilities

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Grading Policy:

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