

CSE 330 Computer Organization and Architecture

Dr. Yinong Chen

Catalog Description:

Instruction set architecture, processor performance and design; datapath, control (hardwired, microprogrammed), pipelining, input/output. Memory organization with cache, virtual memory.

Textbook

Computer Organization and Design: The Hardware/Software Interface, 2nd ed., by D. Patterson and J. Hennessy (Morgan Kaufmann Publishers, Inc.) 1998.

Course Objectives and Outcomes:

1. To understand and apply methods for evaluating and comparing processor performance.
 - Student can use various metrics to evaluate system performance.
 - Student understands the purpose and process of benchmarking.
 - Student understands the effects of various design principles and implementations on processor performance.
2. To gain a detailed understanding of processor implementation for a given instruction set architecture.
 - Student understands the fundamental elements of the MIPS instruction set: Instruction formats, Addressing modes, Register organization.
 - Student understands and can employ modular design techniques to build a simple ALU.
 - Student has detailed understanding of several approaches to processor implementations: Single Cycle, Multicycle, and Pipelined.
3. To gain an understanding of memory organization and the memory hierarchy.
 - Student understands the concepts of temporal and spatial locality.
 - Student can analyze and evaluate cache organizations.
 - Student can analyze various virtual memory schemes.
 - Student understands how a translation lookaside buffer is used.
 - Student can analyze and evaluate TLB organizations.
4. To understand the interconnection of CPU, memory, and I/O.
 - Student is familiar with several I/O performance measures.
 - Student knows what busses are and their role in connecting the major system components.

Prerequisites by Course & Topic

CSE 120 – Combinational and sequential logic design.

CSE/EEE 225 or CSE/EEE 226 - Assembly language programming, including input-output programming and exception/interrupt handling, register-level computer organization

Major Topics Covered in the Course

- Methods for evaluating and comparing processor performance
- Detailed design of processor components
- Pipelining techniques
- Memory organization and the memory hierarchy
- Hardware components that support memory management
- Interconnecting CPU, memory, and I/O

Assessment and Grading

You will be given a homework set every week in the 8-week summer session (one in every two weeks in the Fall and Spring semesters). Each homework set consists of practice exercises and written assignments. The written assignments, which will be turned in for credit, include problem-solving and programming assignments. Some homework sets will contain large programming projects.

You will also be given an in-class quiz every week in the Summer session (one in every two weeks in Fall and Spring) and Quiz dates will not be announced. Any quiz that is missed will be given a score of zero -- no exceptions. However, I will drop the lowest quiz score. No assignment or project, or exam scores will be dropped.

An alternative to a graded activity, except quizzes, may be arranged if a student's absence is caused by documented illness or other conditions beyond the student's control. A written explanation (including supporting documentation) must be submitted to the instructor.

Your performance will be assessed by a number of written assignments, programming projects, quizzes, a mid-term exam and a final exam. Their weights are:

Assignments and Projects	30%
Quizzes	20%
Mid-Term	20%
Final Exam	30%

Your final letter grade is decided according to your percentage points as follows:

A	90% or more
B	80% or more
C	70% or more
D	60% or more
E	less than 60%

The grade of "I" (incomplete) can ONLY be given when a student, who is doing otherwise acceptable work (a passing grade), is unable to complete a part of work (e.g., the final exam) because of documented illness or other conditions beyond the student's control. The student must discuss with the instructor and complete an application form from the department before the part of work is due or as soon as the circumstances are known.

Grading Appeals

Any questions or appeals on grades of homework, projects, or quizzes must be done in writing by completing the "Grade Inquiry Form" within a week from the day the assignment was returned or grading comments were published on-line. State the problem and the rationale for any change in the grade in your appeal. Please note that all course instructors are required to submit sample copies of each assignment/quiz to the department at the end of the course. I may copy all or a part of assignments/quizzes before I return them to the class. All re-grading requests will be compared with the copies we have.

Cooperation

You are encouraged to cooperate in study group on **preparing** assignments, projects, quizzes and exams. However, anything you turn in must be your own work: You must write up your own solution with your own understanding. If you use an idea that is found in a book or other sources, or that was developed by someone else or jointly with some group, make sure you acknowledge the source and/or the names of the persons in the write-up for each problem.

