

CSE230 Computer Organization and Assembly Language Syllabus and Course Information

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Catalog Description

Fundamentals of computer operation, instruction set architecture, assembly language programming, computer organization, pipelining, memory hierarchy, multi-core and multi-processors.

Prerequisites

CSE 120, or EEE 120: Digital Design Fundamentals.
CSE 100 or CSE 110: Principles of Programming

Text (Required)

David A. Patterson and John L. Hennessey, "Computer Organization and Design - The Hardware Software Interface", Morgan Kaufmann, 4th edition.

Learning Outcomes

Students who complete this course will be able to

- Understand MIPS assembly language, and write assembly language programs for simple problems, including function calls.
- Understand the data representation (2's complement, single and double precision float point) inside the processor, and perform arithmetic operations on them.
- Understand the working of a single-cycle, and pipelined processor, including basic schemes of hazard detection and avoidance.
- Understand the rationale behind the memory organization, and know how caches operate.
- Demonstrate an introductory knowledge of multi-processors, and multi-cores architectures

Major Topics Covered in the Course (Tentative)

1. Introduction (1 week)
 - Overview
 - Computer Performance
2. MIPS Assembly Language (4 weeks)
 - Instruction Architecture
 - Instruction Formats
 - Arithmetic Instructions
 - Load and Store Instructions
 - Branching Instructions
 - Procedure Call and Parameter Passing
 - Recursive and Nested Procedure Calls
3. Computer Arithmetic (2 weeks)
 - ALU Design
 - Multiplication and Division
 - Floating-Point Representation and Biased Notation
 - Floating-Point Operations
4. Processor Design (3 weeks)
 - Single Cycle Processor Implementation
 - Pipelined Processor Implementation
 - Data and Control Hazards
 - Dynamic Predication and Pipeline Performance
 - Exceptions and Interrupts
 - Instruction Level Parallelism
5. Memory Hierarchy (2 weeks)
 - Cache
 - Memory
 - Storage
6. Input and Output (1 week)
 - I/O Bus
 - I/O Management
 - I/O Performance and RAID
 - Server Design
7. Multi-cores and Multi-processors (1 week)
 - Multicore with Shared Memory
 - Multiprocessors
 - Threading

Assessment and Grading

Your performance will be assessed by assignments, programming projects, quizzes, a Mid-Term Exam and a Final Exam. Their weights are:

Assignments and Projects	40%
Quizzes	20%
Mid-Term	18%
Final Exam	22%
Total	100%

The final letter grade is decided according to the percentage points obtained as follows:

A-, A, A+	90-92, 93-95, 96-100%
B-, B, B+	80-82, 83-85, 86-89%
C, C+	70-75, 76-79%
D	60-69%
E	less than 60%

The grade of "I" (incomplete) can be given ONLY when a student, who is doing otherwise acceptable work (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. In the latter case, 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. Please see ASU grading policies at: <http://students.asu.edu/grades-grading-policies>

Extra Credit and Alternative Activity

Missing a graded activity will be given zero credit. In-class exercises and quizzes may not be made up. One additional quiz will be arranged to override one missing or poor quiz score.

No extra credit-activities will be given to any individual. Extra credit-activities may be given to the entire class. An alternative to the assignment and exam may be arranged if a student misses the activity and the absence is caused by documented illness or personal emergency that made the completion/attending impossible. A written explanation (including supporting documentation) must be submitted to the instructor before the part of work is due or as soon as the circumstances are known.

Grading Appeals

Any inquires or appeals on grades of homework, projects, or tests must be done in writing by completing the "Grade Inquiry Form" within a week from the day the assignment was returned or comments were published on-line. State the problem and the rationale for any change in grade in your appeal.

Cooperation

You are encouraged to cooperate in study group on preparing assignments, projects, tests and exams where permitted. However, anything that 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 from 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.

The instructor and the TA will **CAREFULLY** check any possible proliferation or plagiarism. We will use the document/program comparison tools like MOSS (Measure Of Software

Similarity) to check any assignment that you submitted for grading. The Ira A. Fulton School of Engineering and the Department of Computer Science and Engineering expect all students to adhere to ASU's policy on Academic Dishonesty. These policies can be found in the Code of Student Conduct:

http://www.asu.edu/studentaffairs/studentlife/judicial/academic_integrity.htm

ALL cases of cheating or plagiarism will be handed to the Dean's office. Penalties include a failing grade in the class, a note on your official transcript that shows you were punished for cheating, suspension, expulsion and revocation of already awarded degrees.