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## CSE 471 Computer Design and Organization

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### **Credits**

4.0 (3 hrs lecture, 1 hr section)

### **Lead Instructor**

Susan Eggers

### **Textbook**

- *Computer Architecture*, Hennessy

### **Course Description**

CPU instruction addressing models, CPU structure and functions, computer arithmetic and logic unit, register transfer level design, hardware and micro-program control, memory hierarchy design and organization, I/O and system components interconnection. Laboratory project involves design and simulation of an instruction set processor.

### **Prerequisites**

either CSE 352 or CSE 378.

### **CE Major Status**

Selected Elective

### **Course Objectives**

Teach the design and architecture of major components of the structure of the central processing unit and memory hierarchy of modern microprocessor systems. Use a cycle by cycle simulator to illustrate logic complexities.

### **ABET Outcomes**

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data

- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (e) an ability to identify, formulate, and solve engineering problems
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

## **Course Topics**

- Pipelining
- Branch prediction
- Exceptions
- Examples of CPU's in modern microprocessors
- Exploiting Instruction Level Parallelism
- Scoreboard and Tomasulo's algorithm
- Superscalars
- Caches and cache assists
- Hardware assists for paging systems
- TLB's
- Symmetric MultiProcessors
- Cache coherence
- Synchronization