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Instructor Office Location: 236B, Olsson Hall
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TA: Zhanxiang Huang
TA Office Location: OLS 235 Seat 6
TA Office Hours: F 9:30-11:30 AM

Course Overview:
In this course we shall study the design of modern microprocessors. We shall look at how the processor core and the memory system are designed and also consider some issues when we interconnect them to build a multiprocessor system. This course would aid in the preparation for the PhD Comprehensive Exam. However, due to the sheer volume of material in the examination reading list, only a subset of those topics will be covered in this course. The course material is drawn from both the textbook, as well as classic papers from computer architecture conferences and journals.

The course will consist of a midterm and a final examination. There will be regular homework assignments that would involve simulation and quantitative evaluation using a microarchitecture simulator. In addition, there will be two projects. The first project will require coding and the second would involve a comparative analysis of actual microprocessor implementations. Students may work in pairs for the projects. Detailed project descriptions will be announced separately.

Grading:

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Midterm</td>
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<td>Final</td>
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<td>Homework</td>
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<td>Projects</td>
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Prerequisites:
ISA concepts, computer arithmetic, and digital logic.

Required Textbook:

Supplemental Textbook:

Reading List:


**Tentative List of Topics:**

- Basics of pipelining
- Multi-cycle pipelines and implementing precise interrupts
- Superscalar processor design
  - Fetch and decode issues; branch prediction
  - Register renaming
  - Dynamic instruction scheduling
  - Load/store unit design and memory dependence prediction
  - Simultaneous Multi-Threading
- Memory-system design
  - Basics of caches, virtual memory, and main-memory design
  - Victim caches, prefetching, and stream buffers
- Multiprocessor concepts
  - Coherence and Consistency
  - Synchronization
  - Relaxed consistency models

**Code of Honor:**

You are free to discuss your thoughts and ideas and have joint study sessions with other students to prepare for the examinations. You are also welcome to discuss freely with your partner about issues related to your projects. However, copying code or homework assignments, any malpractice in the examinations or projects (e.g., reporting fraudulent data, plagiarism) would be treated as a serious violation of the Code of Honor.