Course Information

Instructor: A. Yavuz Oruç
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Office Hours: TuTh, 2:30-4:00 pm.

Textbooks (Not Required):
- Structured Computer Organization, A. Tanenbaum
- Computer Organization and Architecture, W. Stallings
- Computer Systems: Organization and Arch., J. Carpinelli

Lecture Notes will be provided in pdf and/or html formats

Prerequisite: ENEE 244 and completion of all lower-division technical courses in the EE curriculum. Electrical Engineering and Computer Engineering majors may not substitute CMSC 311 for ENEE 350. Not open to students who have completed ENEE 250.

Syllabus Description: Structure and organization of digital computers. Registers, memory, control and I/O. Data and instruction formats, addressing modes, assembly language programming. Elements of system software, subroutines and their linkages.

Tentative Topics:
1. Overview of Computer Systems
2. Languages, Levels and Virtual Machines
3. System Level Computer Organization

Metrics of Performance - Cost, Speed, Efficiency, Throughput, Utilization
## Performance Tradeoffs - Amdahl's Law

### 4. Processor Specification and Design
- **Assembly Language Level** (machine programs subroutines)
- **Machine-Level Organization** (Instruction Set Architectures)
- **Micro-Level Organization** (MicroArchitectures)

### 5. Memory Systems
- **Hierarchical Memory Design**
- **Memory Management** (Software Layer)
- **Virtual Memory** (Hardware Layer)

### 6. Input/Output Systems
- **Polling**
- **Interrupts**

### 7. Multiprocessor Architectures
- **Single Instruction Multiple Data (SIMD) Machines**
- **Multiple Instruction Multiple Data (MIMD) Machines**

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### Overview of Computer Systems

#### Market Considerations
- **Price** (How much is it?)
  - Less than $1,000
  - Between $1,000 and $2,000
  - Between $2,000 and $4,000
  - More than $4,000
- **Box Maker** (Whose logo is it?)
  - Apple -- Compaq -- Dell -- Gateway -- Hewlett-Packard -- IBM--Packard Bell -- Sun Microsystems -- Mail order/third party -- Mom/Pop Assembly line -- Self-Assembly
- **CPU vendor** (Whose Chip-set is it?)
  - AMD -- Intel -- Motorola -- IBM -- MIPS -- Sparc
- **Software** (What operating system?)
  - Linux -- Unix -- Mac Os -- Mac Os X
  - Windows 95, 98, 2000, NT, XP

#### Performance Considerations
- **How fast does it execute programs?**
  - Clock Speed (MHz, GHz), CPI
  - Floating-Point Unit
  - Graphics Accelerator
  - Multiprocessing
  - Memory
    - RAM (MBytes, GBytes)
    - Hard Disk (GBytes)
    - Compact Disk (M/GBytes)
    - Flash (Stick) Memory (M/GBytes)
    - Zip/Jaz Disk (M/GBytes)
    - Tape Memory (GBytes)
    - Floppy Disk (K/MBytes)

#### Input/Output
- (What application software does it run?)
Word processing, graphics --CAD/math, Database --Web programming

Monitor (Screen size, pixel depth, resolution)
Keyboard (Extended character set)
Printer (Color, resolution, speed)
Scanner (Scanning pixel depth and resolution)
Modem (Bit rate)