Midterm 1 Topics

You are expected to know:

- Clocks and Clock Cycles
- Latches and Flip-flops
- Registers and Register Files
- SRAM
- DRAM
- Synchronous Memories
- Memory Hierachy
- Main Objectives of a Memory Hierarchy
- Principles of Locality
- Memory Hierarchy Rules:
- Direct-Mapped Caches
- Calculating Cache Size
- Spatial Locality and Multiword Cache Blocks
- Mapping an address to a multiword cache block
- Performance Issues with Multiword Blocks
- Handling Cache Misses
- Handling Instruction Misses
- Handling Data Misses
- Handling Cache Writes
- Write Miss in a Single-Word Block Cache
- Combined Data and Instruction Caches Versus Separate Caches
- Handling Writes in Multi-word Blocks
- Designing Memory to Support Caches
- Memory Organizations
- Measuring and Improving Cache Performance
- Effects of changes to architecture on performance
- Average Memory Access Time (AMAT)
- Reducing Miss Rate by Flexible Placement of Blocks

- Set associativity
- Fully associative caches
- Reduction in Miss Rate
- Locating a Block in the Cache
- Cost of Cache: Number of Comparators and Tag Bits.
- Block Replacement Policy
- Multilevel Caches
- Virtual Memory
- Paging and Page Table Implementations
- Virtual Address Translation
- TLBs