CS M51A Fall 2019: Syllabus and Schedule

Week 1

  
  **Readings:** Chapter 1.


  **Readings:** Chapter 2.

  Friday, 9/27, Discussion: Binary and decimal number systems and conversions. Boolean Algebra. (Appendix A).

  **HW1 posted.**

- Tuesday, 10/1. Combinational systems: Binary specification of inputs/outputs and functions. Central concept of functional description: switching function (SF). Incompletely specified SFs. Basis of hierarchical specification and design: Composition of SFs. Switching algebra, switching expressions (SEs), evaluation of SEs, equivalent SEs, and algebraic transformations of SEs. Standard forms for SEs: sum of products (SOP) and product of sums (POS).
  
  **Readings:** Chapter 2, Appendix A.

Week 2


  Friday, 10/4. **HW1 due.** Discussion of Lectures 1 and 2.
• **Tuesday, 10/8.** Physical level: CMOS transistor switches and gates: NOT, NAND/NOR, AND/OR, and XOR.
  
  Readings: Chapter 3.
  
  **Sample Quiz 1 posted + solutions.**

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**Week 3**

• **Thursday, 10/10.** Complex gates. Transmission gates and their use. Timing parameters, load, load factors, and propagation delays. Three-state drivers and buses. VLSI design styles and packaging.
  
  Readings: Chapter 3.
  
  **HW2 posted.**
  
  Friday, 10/11: **QUIZ No.1. Discussions**

• **Tuesday, 10/15.** Gate networks definition and description. Universal gate sets. Functional analysis. Timing analysis. Logic levels and critical path. **Readings: Chapter 4.**

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**Week 4**

• **Thursday, 10/17.** Design of combinational systems: minimal two-level networks. Graphical minimization of expressions (Karnaugh Maps).
  
  Readings: Chapter 5.
  
  **Friday, 10/18: HW2 due. Discussions.**

• **Tuesday, 10/22.** NAND and NOR networks. Programmable logic arrays (PLAs). **Readings: Chapter 5. Examples of designs.**
  
  **HW3 posted.**
  
  **Sample Quiz 2 posted + solutions.**

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**Week 5**

• **Thursday, 10/24.** Synchronous sequential systems. Main types of sequential systems: Moore and Mealy Machines. Finite-state machines (FSM). State description: state table and state diagram. Time behavior. Finite memory machines. **Readings: Chapter 7.**
  
  **Friday, 10/25: QUIZ No. 2. Discussions**

• **Tuesday, 10/29.** Reduction of the state set. Binary specification and types of sequential systems.
  
  **Sample Midterm posted + solutions.**

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**Week 6**

  
  **Friday, 11/1: HW3 due, Discussion.**

• **Tuesday, 11/5.** **MIDTERM EXAM – in class –**
  
  The exam covers Chapters 2, 3, 4, and 5. Closed books and notes. Four cheat sheets allowed. Tables and identities given if needed.
  
  **Sample Quiz 3 posted + solutions.**
Week 7


  Friday, 11/8: **Discussion.**

- **Tuesday, 11/12.** Design of sequential networks with flip-flops. Excitation functions. Special state assignments: "one flip-flop per state" and shifting register. Examples.

  **Readings:** Chapter 8.

Week 8

- **Thursday, 11/14.** Chapter 8 (cont.) **Readings:** Chapter 8.  
  Friday, 11/15: **Quiz 3 (Chapters 7 and 8). Discussion.**

- **Tuesday, 11/19.** Chapter 8 (cont.) Standard combinational modules and networks - Introduction.  
  **Readings:** Chapter 8 and Chapter 9.  
  **Sample Quiz 4 posted + solutions.**

Week 9

- **Thursday, 11/21.** Decoders and Encoders. Implementation and uses. Large decoders: coincident and tree. **Readings:** Chapter 9.

  Friday, 11/22: **QUIZ 4 (Sections 8.7, 8.8, 8.9 and 8.10). HW4 due. Discussion.**

  **Sample Final - replaces HW5 - do not turn in**

Week 10

  **Solutions to Sample Final posted.**

- **Thursday, 12/5.** Standard sequential modules and networks: registers, shift registers, and counters. Their specifications, implementations, implementation of larger modules, and uses. **Readings:** Chapter 11.  

  Friday, 12/6: **Discussion.**
• **FINAL EXAM**, December 10, Tuesday, 3:00 - 6:00pm, Broad Art Center 2160E. The problems will be on the material in Chapters 7, 8, 9 (except Sec. 9.3), Chapter 10 (Sections 10.1 (skip subsection "Module Propagate and Generate Signals"), 10.2 (skip subsection "Carry-lookahead Adder Network"), and 10.3), and Chapter 11 (Sections 11.1, 11.2, and 11.3 up to "counter as the state register"). However, the exam is comprehensive, i.e., you need to know material covered in Chapters 2, 3, 4, and 5. Closed textbook and notes. Four cheat sheets allowed. Tables provided if needed.