
CSE 369 Intro to Digital Design

Credits

2.0 (1.5 hrs lecture)

Lead Instructor

Justin Hsia

Textbook

The **optional** text is the *third edition* of Brown and Vranesic's *Fundamentals of Digital Logic with Verilog Design* book ("B&V"), ISBN **9870073380544**. **Course Description**

Course Description:

Introduces the implementation, specification, and simulation of digital logic. Boolean algebra; combinational circuits including arithmetic circuits and regular structures; sequential circuits including finite-state-machines; and use of field-programmable gate arrays (FPGAs).

Emphasizes simulation, high-level specification, and automatic synthesis techniques. No credit if EE 271 has been taken.

Prerequisites

CSE 143, 311

CE Major Status

Required

Course Objectives

1. *Design and implement* digital circuits and systems in the laboratory using fundamental concepts.
2. *Write* Boolean equations for basic combinational logic circuits, use Boolean algebra to simplify such equations, then implement the resulting designs in the laboratory.
3. *Design and implement* combinational circuits of medium complexity in the laboratory.
4. *Design and implement* basic sequential circuitry and finite state machines in the laboratory.
5. *Identify* real world timing problems in both combinational and sequential circuits and design basic digital systems that are tolerant of such effects.
6. *Design and implement* combinational and sequential circuits using programmable logic devices.
7. *Develop* basic structural models of digital systems using the Verilog hardware design language.

ABET Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (H)
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (H)
3. an ability to communicate effectively with a range of audiences (M)
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (M)
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (H)
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions (H)
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (H)

Course Topics

- Combinational Logic
- Verilog Basics
- Karnaugh Maps
- Sequential logic
- Finite state machines (FSMs)
- FSM Design, Multiplexors, Adders
- Encoders, Decoders, Registers, Counters
- Project Tips
- Computer Components, FPGAs