



蘇州大學
Soochow University

CS 301 Digital Systems

Fall 2023

Course Credits: 4

Contact Hours: 55 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

The course addresses the concepts, principles and techniques of designing digital systems. Students will learn the fundamentals of digital systems applying the logic design and development techniques. Topics include fundamentals of digital logic, number systems, codes, computer arithmetic, Boolean algebra, minimization techniques, basic components of digital circuits such as logic gates and flip-flops, design of combinational and sequential circuits, memory devices, and programming logic.

Upon Completion of this Course, students will be able to:

1. design executable models using a hardware description language;
2. explain the concept of memory in digital systems, and design basic memory modules;
3. use basic digital tools and devices such as digital oscilloscopes, PLAs, PROMs and VHDL;
4. design the finite state machine using algorithmic state machine charts and perform simple projects with a few flip-flops.

PREREQUISITES

CS 290 Discrete Mathematics for Computer Science

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM

POINTS



2 Assignments	20 Points
5 Lab Reports	25 Points
2 Quizzes	20 Points
Midterm	15 Points
Final Exam	20 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Digital Design: Principles and Practice. 5th Edition, by John F. Wakerly. Pearson, 2017.

Recommended (Optional) Texts or Other Materials:

None.

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: Number Systems and Codes Topic 2: Digital Circuits Topic 3: Combinational Logic Gates: AND, OR, NOT, NAND, NOR, EXOR, EXNOR Topic 4: Truth Tables Assessments: Lab #1 Assignment #1



Module 2	Topics: Topic 5: HDL-Based Digital Design Topic 6: The Verilog Hardware Description Language Topic 7: Programmable Logic Arrays Topic 8: Programmable Array Logic Devices Assessments: Lab #2 Quiz #1
Module 3	Topics: Topic 9: Introduction to Sequential Logic Topic 10: Level-sensitive Latches/Edge-sensitive Flip-flops Topic 11: Counters (Synchronous and asynchronous) Topic 12: Memory Circuits Assessments: Lab #3 Assignment #2 Midterm Exam
Module 4	Topics: Topic 13: Logic Circuit Analysis and Optimization Topic 14: A/D and D/A Interfaces Topic 15: Read-only Memory (ROM) and Random Access Memory (RAM) Topic 16: Complex Programmable Logic Devices Assessments: Lab #4 Quiz #2
Module 5	Topics: Topic 17: Field Programmable Gate Array (FPGA) Design Optimization Topic 18: Application Specific Integrated Circuits (ASICs): Topic 19: Formal Design Methods Topic 20: Designing Digital Systems Assessments: Lab #5 Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.



If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed.



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The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.