

Digital Systems Design and Laboratory

[0. Course Introduction]

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Enrollment

❑ If you have not enrolled this course...

➤ Visit the NTU enrollment system

Introduction to Myself

❑ B.S. Student

- 2001.09--2005.06, CSIE Department, NTU

❑ M.S. Student

- 2005.09--2007.06, GIEE (EDA Group), NTU

❑ Ph.D. Student

- 2009.08--2015.08, EECS Department, UC Berkeley

❑ Researcher

- 2015.09--2018.07, Systems and Software Division, Toyota InfoTechnology Center (Mountain View, CA)

❑ Assistant Professor

- 2018.08--2021.07, CSIE Department, NTU

❑ Associate Professor

- 2021.08--, CSIE Department, NTU

Reasons of Teaching This Course

- EDA background in my M.S. years

- What is Electronic Design Automation (EDA)?

Reasons of Taking This Course

- ❑ Get some units to graduate

- ❑ Learn fundamental knowledge of "logic" and "hardware"

- Let's talk about my recruiting experience at CKSH...
- You should be better than a pure software programmer
 - Software is running on hardware
 - Hardware implementation is usually faster than software implementation
 - Disadvantage?
- You may work in the "hardware" industry in Taiwan
 - No matter what your role (software engineer, system engineer, hardware engineer, etc.) is

- ❑ Broaden your vision

- Software cannot be missing in the hardware industry

Websites, Office Hour, and TA

❑ Slides, homework assignments, homework solutions, announcement, and discussion

➤ NTU COOL: <https://cool.ntu.edu.tw/courses/33220>

➤ You are mandatory to check the announcement there

❑ Homework submission and grading

➤ Gradescope: we will register you later

❑ Office hour

➤ The weeks with in-person lectures: during the lectures

➤ The weeks without in-person lectures: online, 2:20--3:15pm on Monday

❑ TAs

➤ Bo-Ting Guo

➤ Pin-Chun Huang

1st-Half Lecture Schedule (Tentative)

In-Person
Lecture +
Videos

Videos
Only

Week	Date	Topic
Week 1	2/19	===== In-Person Lecture + Videos ===== [LEC-00] Course Introduction [LEC-01] Number Systems and Conversion [DIS-01] Number Systems and Conversion
Week 2	2/26	===== Videos Only ===== [LEC-02] Boolean Algebra [LEC-03] Boolean Algebra (Continued)
Week 3	3/4	===== Videos Only ===== [LEC-04] Applications of Boolean Algebra [LEC-05] Karnaugh Maps
Week 4	3/11	===== In-Person Lecture + Videos ===== [DIS-02] Boolean Algebra [DIS-03] Boolean Algebra (Continued) [DIS-04] Applications of Boolean Algebra [DIS-05] Karnaugh Maps
Week 5	3/18	===== Videos Only ===== [LEC-06] Quine-McCluskey Method [LEC-07A] Multi-Level Gate Circuits
Week 6	3/25	===== Videos Only ===== [LEC-07B] Multi-Level Gate Circuits [LEC-08] Combinational Circuit Design
Week 7	4/1	===== In-Person Lecture + Videos ===== [DIS-06] Quine-McCluskey Method [DIS-07] Multi-Level Gate Circuits [DIS-08] Combinational Circuit Design
Week 8	4/8	===== In-Person Exam ===== Midterm

2nd-Half Lecture Schedule (Tentative)

In-Person
Lecture +
Video

Videos
Only

Week	Date	Topic
Week 9	4/15	===== In-Person Lecture + Videos ===== [LAB-01] Combinational Circuit Design [LEC-09] Multiplexers, Decoders, and Programmable Logic Devices [DIS-09] Multiplexers, Decoders, and Programmable Logic Devices
Week 10	4/22	===== Videos Only ===== [LEC-11] Latches and Flip-Flops [LEC-12A] Registers and Counters
Week 11	4/29	===== Videos Only ===== [LEC-12B] Registers and Counters [LEC-13] Analysis of Clocked Sequential Circuits
Week 12	5/6	===== In-Person Lecture + Videos ===== [LAB-02] Sequential Circuit Design [DIS-11] Latches and Flip-Flops [DIS-12] Registers and Counters [DIS-13] Analysis of Clocked Sequential Circuits
Week 13	5/13	===== Videos Only ===== [LEC-14] Derivation of State Graphs and Tables [LEC-15] Reduction of State Tables
Week 14	5/20	===== Videos Only ===== [LEC-16] Sequential Circuit Design [LEC-21] Course Summary
Week 15	5/27	===== In-Person Lecture + Videos ===== [DIS-14] Derivation of State Graphs and Tables [DIS-15] Reduction of State Tables [DIS-16] Sequential Circuit Design
Week 16	6/3	===== In-Person Exam ===== Final Exam

Recording

- ❑ Why "videos only" in some weeks?
- ❑ Well-recorded (concise) videos in previous semesters
 - The material except the course introduction is the same
 - We will not re-record the lectures and the discussion sessions
 - We will still do some processing on lecture videos

Textbook

❑ C. H. Roth, Jr. and L. L. Kinney, Fundamentals of Logic Design, 7th Edition

➤ It is not mandatory to buy it

Homework

❑ Homework is due at noon

➤ No late homework is accepted

- Though the submission site will be open until 1pm

➤ Exception: you email Chung-Wei and get the approval before the deadline (noon)

❑ You are encouraged to work on homework in study groups, but you must write up the solutions on your own

Midterm and Final Exam

❑ Midterm

- You can bring 1 page of single sided A4 note
- You can ask (= challenge) for regrading (based on problems) before a deadline, and then we will regrade them
 - For each problem
 - If your score becomes higher, you win the challenge
 - Otherwise, you lose the challenge
 - Starting from the 3rd failed challenge, you get additional deduction

❑ Final

- You can bring 2 pages of single sided A4 note
- Same regrading policy

Grading

❑ Homework/Lab: 20%

- Homework 1: 4% [Week 4]
- Homework 2: 4% [Week 6]
- Homework 3 + Lab 1: 6% [Week 11]
- Homework 4 + Lab 2: 6% [Week 14]

❑ Midterm: 40% [Week 8]

❑ Final Exam: 40% [Week 16]

❑ Academic Dishonesty = Failing by Default

❑ Grading philosophy

- Even with notes in exams, you still need sufficient practices
- There are difficult questions in exams
- Fairness between "in-person lecture" and "videos" is not negotiable
- Final letter grades will be adjusted but not negotiable

Q&A