Advanced VLSI Design
高等積體電路設計

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National Taiwan University
Course Information

❖ Lecture Time
  ❖ EE II Rm. E2-143, Wednesday 2:10PM~5:00PM

❖ Instructor
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❖ Teaching Assistant (TA)
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❖ Class web page
  ❖ http://access.ee.ntu.edu.tw/course
Course Objectives

- This course is designed for undergraduate students who have taken “Introduction to VLSI”, and graduate students who want to learn advanced VLSI design skills and tools.
- In the content part, we will cover the design techniques for advanced VLSI systems, such as advanced computer arithmetic, low-power VLSI design, and Wave-pipelining and Asynchronous VLSI designs.
- To follow the trend of “System-on-Chip (SOC)” design, we will add the new topic: System-on-a-Programmable-Chip (SOPC). Three labs will be given to learn how to use SOPC.
- Extensive homeworks and Labs will be given in this course.
Course Outline

- Advanced Computer Arithmetic Operations (Slides)
  - Booth-encoded Multiplier
  - 2’s complement Multiplier
  - Division Circuits
  - CORDIC (Low-cost Rotational Circuits)
  - Residue Number System (RNS)
  - Distribution Arithmetic (DA)
  - Digital-serial Architectures

- Redundant Arithmetic a. (Chap. 14 of Textbook)
- Numerical Strength Reduction (Chap. 16 of Textbook)
- Low-power CMOS Design (Chap. 17 of Textbook)
- Wave-pipelining VLSI Design (Chap. 16 of Textbook)
- Asynchronous VLSI Design (Chap. 16 of Textbook)
- System-on-Programmable-Chip (SOPC) system and labs (one month)
- Final special project proposal writing and presentation
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Textbooks

- Course notes and papers.

Referenced Tool textbooks:

Class Policy

- Grading method
  - Homework and Labs: 36%
  - Midterm exam: 32% (in class, close book)
  - Final Project: 30%
  - Participation: 2%

- Homework
  - Hand in before class begins on the due date.
  - Discussion with classmates is encouraged, copying not allowed

- Final Project
  - Project proposal (4~6 pages) due: 12/4/91
  - Final presentation and report: 12/18/91 ~ 1/8/92

Also note: PLEASE
- Turn off your cell phone during class
What can you learn from this course?

- Algorithms and architectures for Advanced computer arithmetic
- New VLSI design concepts that are not covered in under basic VLSI courses.
- SOPC design flow (evolved from FPGA design flow): Similar to VLSI Design Laboratory Course but with more emphasis on emerging SOC design concept (e.g., RMM) and design kit (e.g., SOPC)

Suitable for
- Undergraduate students who want to learn complete digital IC design flow after taking “Introduction of VLSI”
- Non-ICS Graduate students who want to learn more design skills for future jobs (but with basic VLSI background)