

1. Course number and name

EE 466: VLSI Design

2. Credits and contact hours

3 (three lecture hours per week)

3. Instructor's or course coordinator's name

Partha Pande

4. Textbook, title, author, and year

Weste and Harris. 2010. *CMOS VLSI Design* (4th ed.). Pearson. ISBN: 978-0321547743.

Other supplemental materials

Instructor notes/slides will be provided for some topics.

5. Specific course information

a. *Catalog description:* Very Large Scale Integration circuit, system and physical design using CAD software; project specification, modeling, implementation, documentation, and reporting.

b. *Prerequisites or corequisites:* EE 234 with a C or better; certified major in Electrical Engineering, Computer Science, Computer Engineering, or Software Engineering.

6. Specific goals for the course

By the end of the course, students will be able to

- Explain the operation principles of MOS transistors (1)
- Explain the characteristics (DC, AC) of MOS inverter circuit (1, 2)
- Design, analyze, and optimize static MOS gate circuits (2)
- Design and analyze high-speed CMOS logic circuits (1, 2, 6)
- Design and analyze transfer gate and dynamic logic circuits (1, 2, 6)
- Design and analyze sequential logic (1, 2, 6)
- Understand and explain logical effort (2)
- Understand, design, and analyze arithmetic circuits (1, 2)
- Understand and explain various implementation methods for digital systems (2)
- Understand, design, and analyze semiconductor memory (1, 2, 6)
- Understand and explain the characteristics of advanced devices (2)

7. Brief list of topics to be covered

- MOS transistors,
- MOS inverter circuit,
- Static MOS gate circuits,
- High-speed CMOS logic design,
- Transfer gate and dynamic logic design,
- Sequential logic,
- Logical effort,

- Arithmetic circuits,
- Implementation methods,
- Semiconductor memory design,
- Advanced devices beyond CMOS.