
Prerequisite: EE 3329.

Lectures: Wed/Thu 5:00pm – 6:15pm, LEL 234

Catalog Description: Photolithography, CMOS Fabrication, MOSFET Operation, CMOS passive elements, design rules and layout, CAD tools for IC design, inverters, static logic and transmission gates, dynamic logic.

Instructor:
Dr. Vittit Kantabutra, Associate Professor of Electrical Engineering, email: kantviti@isu.edu
Dr. Steve C. Chiu, Associate Professor of Electrical Engineering, email: chiustev@isu.edu

Grading Policy: Course grades will be based on the following distribution: 4 written assignments (40%), up to 4 VLSI design assignments (40%), and 1 final exam (20%). All assignments and the final exam are individual. However, collaborative learning between students is encouraged.

Late Policy: If an assignment cannot be submitted by the deadline, you must contact the instructor before the deadline to arrange a late submission. Otherwise, it will not be accepted. A late submission will entail a penalty of 10% of the maximum points per delayed day. For example, a submission that is 2 days late and would have received 80 points out of 100 will receive 80 – 100 \times 10\% \times 2 = 60 points.

Planned Class Schedule and Topics Covered:

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<th>Topic</th>
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<tr>
<td>August</td>
<td>Introduction</td>
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<td>September</td>
<td>MOS Transistor Theory (Ideal/Non-ideal), Case Studies*</td>
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<tr>
<td>October</td>
<td>CMOS Processing (Technology, DR/DRC, CAD Issues), Case Studies*</td>
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<td>November</td>
<td>Delay Models in VLSI (Elmore, Linear), Case Studies*</td>
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<td>December</td>
<td>Case Studies*</td>
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Case Studies include MIPS architecture design, passive elements and other pertinent topics.

Course Learning Objectives:

1. Students have knowledge of CMOS transistor based devices and VLSI systems
2. Students have the essential synthesis skills for VLSI circuits and devices

How to do well in this class:

It will be necessary to memorize certain essential principles to practice with them. But memorization alone will not ensure a good grade. You need to understand the concepts that we discuss in this class and be able to apply them. You will not be able to successfully prepare for the exams the night prior to the exam, nor will you be able to complete an assignment the day before it is due.
Come to class, pay attention, ask questions, then review the material after each class, and work hard on the assignments. You will have copies of my class slides so that you can pay close attention during class and not have to worry about taking notes. A couple of days before the exams, go over the materials and summarize them, then spend time on your summary.

If you missed or will miss an exam, you must provide documentation justifying that absence, or you will receive a grade of zero on the exam. In case of illness, you must provide written documentation from your physician. In case of personal problems, you must provide a statement from a responsible independent source justifying your absence. No other flexibility will be provided.

**Ethics and Code of Conduct:**

Engineers have an immense responsibility for public safety. Our civilization is built in large part upon the technology created by engineers. The technology must be safe and effective. Generations of engineers have earned the respect of the public through their ethical and professional behavior. A cornerstone of that ethical behavior is the voluntary admission of ignorance. An engineer does not misrepresent his capabilities; he does not claim to be able to design something unless he is truly able to do so. Misrepresentation of ability endangers the public.

As engineering students you are held to the same high standard of ethical behavior as professional engineers. The very idea of cheating is anathema to engineers. This policy on academic dishonesty is a consequence of the engineering profession's responsibility for public safety.

**Academic Integrity**

*Academic integrity* is a fundamental expectation of all students in this course. Cheating, plagiarism, and other forms of academic misconduct will not be allowed in this course. Below is a list of commonly seen misconducts. Please note that this is *not* a complete list. It is your responsibility to be familiar with the student code of conduct, and conduct yourself according to the standards.

- Copy answers from another student's examination sheet, assignment, or project report.
- Copy answers from solutions provided to students who took the course previously.
- Copy answers from other sources or discussions that you did not participate in.
- Make use of notes during a closed book or closed notebook examination.
- Make use of electronic devices not allowed in an exam.
- Allow another student to take an exam in your place.
- Represent the work of another individual as your own.
- Assist another student to violate academic integrity.