
ECE 4590/6590
INTEGRATED CIRCUIT DESIGN
FALL 2021
SYLLABUS PART ONE

INFORMATION ABOUT THE COURSE

COURSE TITLE AND COURSE NUMBER: **ECE 4590/6590 Integrated Circuit Design**

TERM: **Fall 2021, 08/18/2021-12/10/2021**

CLASS MEETING TIME AND PLACE: **MWF 2:30-3:20 p.m, Riggs 219**

TIME TO WAIT: **Students may leave after 10 minutes if no one shows up to teach a class.**

INFORMATION ON MODALITY: **In-person, as of 8/17/2021**

INSTRUCTOR NAME: **Yingjie Lao**

INSTRUCTOR EMAIL: ylao@clmson.edu

UNIVERSITY OFFICE PHONE: **612-845-4826 (cell)**

OFFICE ADDRESS/OFFICE NUMBER: **Riggs 313B**

OFFICE HOURS: **TBD or by appointment, via Zoom, send me your link. Face-to-face arrangement can be made by special cases.**

COURSE DESCRIPTION

This class is intended to be an introduction to the design of digital Very Large Scale Integrated (VLSI) circuits.

LEARNING OUTCOMES

At the completion of the course, students should be able to understand the transistor-level and logic-level aspects of integrated circuit (IC), and design digital VLSI circuits. Besides, students should be familiar with Synopsys Computer-Aided Design (CAD) tools that are the de-facto design software in the semiconductor industry.

PREREQUISITES

Preq: ECE 3200 with a C or better. Coreq: ECE 4591/6591.

REQUIRED MATERIALS

Required

N. Weste and D. Harris, "CMOS VLSI Design", Addison-Wesley/Pearson, 4th edition, 2011. ISBN: 0321547748.

Recommended

J. M. Rabaey, "Digital Integrated Circuits: A Design Perspective", Prentice-Hall, 2nd edition, 2003, ISBN: 0130909963.

S. Kang and Y. Leblebici, "CMOS Digital Integrated Circuits", McGraw Hill, 4th edition, 2014. ISBN: 0073380628.

MAJOR ASSESSMENT/GRADING ACTIVITIES

Undergraduate:

- 20% Homework - no late homework, no copying!
- 30% Lab & Project
- 25% Midterm Exam
- 25% Final Exam

Graduate:

- 20% Homework - no late homework, no copying!
- 40% Lab & Project (graduate students are required to complete more projects)
- 20% Midterm Exam
- 20% Final Exam

GRADING SYSTEM

A 100% scale will be used.

A – 85%-100%; B – 75-85%; C – 65-75%; D – 60-65 & F – < 60% (Undergraduate)

A – 85%-100%; B – 75-85%; C – 65-75%; & F – < 65% (Graduate)

The instructor reserve the right to curve test scores in situations that I deem warrant such. Curving test scores is NOT a given.

GRADING POLICIES

No late submission will be accepted.

TOPICAL OUTLINE

- IC Design Flow (1 week)
- CMOS Device Physics and Models (1.5 weeks)
- Basics of CMOS Circuits: Basic Gates, Combinational and Sequential Logic (3 weeks)
- Delay Calculation and Optimization (2 weeks)
- Designing Wires (1.5 weeks)
- Dynamic Styles: Domino and Pass Transistor Logic (1 week)
- Logic Design: Adders and Multipliers (2 weeks)
- SPICE Simulation (3 weeks)

OTHER POLICIES

- You are responsible for all assigned readings and information presented in class and on class Canvas site, including important announcements, due dates, assignments, exams and so forth.
- Regular class attendance is strongly recommended. Every attempt will be made to announce class cancellations in advance. A time for make-up lectures will be determined.
- Cheating of any kind is extremely serious and may result in a course grade of F and/or expulsion from the University.
- Discussion is ok, but plagiarism is not. You can discuss homework or mini-projects with your colleagues but *the solutions you turn in must clearly be your own*.
- Collaboration on exams is NOT ok!
- No "Incomplete" grades will be given for the class, except under verifiable extraordinary circumstances.
- Exams must be taken on the date and time at which they are administered in class. A student absent from a test will receive a grade of 0 for that test. In case of compelling reasons (as judged by the instructor), the instructor will make an effort to accommodate the student, but this should be a last resort. Note: valid excuses MUST be presented to the instructor before or within three days of the missed test or exam. No exceptions will be accepted.
- The Notification of Absence module in Canvas allows students to quickly notify instructors (via an email) of an absence from class and provides for the following categories: court attendance, death of immediate family member, illness, illness of family member, injury, military duty, religious observance, scheduled surgery, university function, unscheduled hospitalization, other anticipated absence, or other unanticipated absence. The notification form requires a brief explanation, dates and times. Based on the dates and times indicated, instructors are automatically selected, but students may decide which instructors will receive the notification. This does not serve as an "excuse" from class. It is a request for an excused absence and students are encouraged to discuss the absence with instructors, as the instructor is the only person who can excuse an absence. If students are unable to report the absence by computer, they may reach the Office of Advocacy and Success via 864.656.0935. Students with excessive absences who need academic or medical assistance can also contact the Office of Advocacy and Success.

- Inclement weather or emergency: Regularly scheduled exams and assignments may need to be adjusted based on unforeseen circumstances. The Faculty Senate Scholastic Policies Committee suggests the following policy, which you may copy into your syllabus: Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email or Canvas within 24 hours of the weather-related cancellation.
- Any student who disagrees with the grading of a homework assignment, project, or exam must contest the grading within one week of the date on which the graded material is returned to the class. This must be done by returning the original graded material to the instructor accompanied by a *written* description of the student's disagreement that is sufficiently detailed to allow accurate consideration of the claim.
- You are not permitted to submit extra work in an attempt to raise your grade.

MODIFICATION STATEMENT: The instructor reserves the right to modify any aspect of the syllabus at any time during the semester for reasons including but not limited to COVID-related situations. The date of this version of the syllabus is August 17, 2021.