ECE 6130 Syllabus

Section A, 3 Credits (3-0-3)
Fall 2026

Faculty Information

Instructor	Email
Saibal Mukhopadhyay	saibal@ece.gatech.edu

General Course Information

Description

ECE6130, Advanced VLSI Systems, explores an advanced treatment of VLSI systems analysis, design, and testing with emphasis on complex systems and how they are incorporated into a silicon environment. Credit is not allowed for both ECE 4130 and ECE 6130.

High-Level Topics: MOSFET, CMOS Circuits, Advanced Circuit Concepts, Sequential Elements, Arithmetic Circuits, Memory Design, VLSI System Concepts, Interconnect, Clocking, Power Delivery, Input/Output, Physical Design

Prerequisites

ECE 3150 or Equivalent courses

Course Learning Outcomes

Outcome 1 (Students will demonstrate expertise in a subfield of study chosen from the fields of electrical engineering or computer engineering):

- Explain the design of combinational circuits, sequential circuits, SRAM and DRAM circuits in CMOS, dynamic logic and current mode logic.
- Expertise in designing and laying out VLSI circuits and sub-systems using Cadence Virtuoso.

Outcome 2 (Students will demonstrate the ability to identify and formulate advanced problems and apply knowledge of mathematics and science to solve those problems):

- Analyze delay, power and area of VLSI circuits using both simulations as well as analytical models.

Outcome 3 (Students will demonstrate the ability to utilize current knowledge, technology, or techniques within their chosen subfield):

- Design VLSI hardware at the circuit level using commercially available design tools.

Required Course Materials

- ❑ Uyemura, *Introduction to VLSI Circuits and Systems*, John Wiley, 2002. ISBN 9780471127048
- ❑ Lecture slides posted in Canvas
- ❑ All materials and notes discussed in class

Course Website and Other Classroom Management Tools

Canvas

Piazza

Grading Policy

Your final grade will depend on the following combination of grades:

Assignment	Date (Tentative)	Weight (Percentage)
Exam – Midterm 1	10/14/2026 (Wednesday)	25%
Exam – Midterm 2	11/23/2026 (Monday)	25%
Exam - Final	As per the final exam matrix	10%
Homework(s)	TBD	40%

There may be homework due on Last days of classes

THERE WILL BE NO Extra Credit Opportunities

Grading Scale

Final grades will be based on the weighted total. The letter grade will be based on the cumulative points considering exams and homework with their corresponding weights. To receive grades B and higher, all parts of the course (three exams and all homeworks) must be completed and submitted.

Grading Scale:

A: 90% or above

B: 80 - 89%

C: 65 – 80%

D: 50 – 65%

F < 50%

Description of Graded Components

Midterm and Final Exam. The multiple-choice, True-False, short answers, and/or analytical problems on a set of topics covered. The exams can be administered via CANVAS assignment or using handwritten hardcopies copies in the class.

Homework(s). Analytical and Simulation Homework to test the concepts learned in the course. All homework submissions must be uploaded as files via CANVAS assignment; the hardcopy submissions will not be accepted.

Attendance and/or Participation

In-person class attendance is required but will not be checked. Pre-recorded video presentation of lecture sides will be uploaded to CANVAS asynchronously. The regular class hours will be used to discuss detailed concepts and answer questions related to lecture materials. The lectures and discussions in the class are the primary study materials and will be covered in the homework and exams. As the course will follow a discussion format the class attendance is highly recommended. In case of a missed class, the student is required to cover the materials discussed in class on their own.

Canvas Resources

- **PowerPoint lecture slides** will be posted on Canvas**.**
- **Pre-recorded video presentation** of lecture sides will be uploaded to CANVAS asynchronously.
- **Course Schedule**.
- **Instructor Office hours:** Canvas Home Page
- **Teaching Assistant (TA) Office hours:** Canvas Home Page

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or http://www.catalog.gatech.edu/rules/18/.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Collaboration & Group Work

The exams require individual work and no collaboration is allowed. The collaboration policies for homeworks will be announced with each homework assignment.

Accommodation for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

All homework and assignments must be submitted by the established deadline. The extension of the deadlines for homeworks and assignments, if any, will be announced via Canvas. No late assignments will be accepted beyond the announced deadlines. Exceptions will be made for "approved Institute activities" (e.g. field trips and athletic events). See http://www.catalog.gatech.edu/rules/4/ for more information.]

All re-scheduling of exams will be notified in the class and/or via CANVAS announcements.

Make-up exams will be considered only under conditions approved by the University policies. See http://www.catalog.gatech.edu/rules/4/ for more information.

If you cannot attend an exam in the scheduled time, please inform the instructor as soon as possible (before the exam date) to discuss possibility (and time) of make-up exam.

Make-up exams are not guaranteed to be the same as the exam given in class.

NO make-up exam or homework will be available to replace unsatisfactory scores or increase points in a midterm, in an assigned homework, or in the final exam.

Any medical documentation, supporting make-up exam requests, should be submitted to the Dean of Students (https://studentlife.gatech.edu/request-assistance) and not to Instructor and/or TA.

Inclement Weather and Digital Learning Days

I will move the lecture to online, synchronous Teams session during inclement weather. I will communicate changes to class schedule using Canvas Announcement.

Student Use of Mobile Devices in the Classroom

Students may use mobile devices for instructional purpose. Laptops and iPads are permitted for taking notes if needed.

Undergraduate Student Academic Success Resources:

Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

"At Georgia Tech, we are concerned about your overall physical, social, and mental well-being." A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)