GEORGIA INSTITUTE OF TECHNOLOGY

SCHOOL OF ELECTRICAL & COMPUTER ENGINEERING

ECE 2031: Digital Design Laboratory | Spring 2027

Syllabus | 2 credit hours

Instructor

Dr. Simon Gautier | simon.gautier@institutlafayette.eu (please include "ECE 2031" in the subject line).

If the instructor is unable to teach due to illness, Dr. Suresh Sundaram may temporarily cover course sessions, subject to program arrangements.

Office Hours

Institut Lafayette, Office 103 | Wednesdays, 9:30–11:30. Other times by appointment, in person or online.

Class Details

Lecture: Study Room, first floor — day/time TBD. Lab: Institut Lafayette, Level 0 — day/time TBD.

The official meeting times and any room changes will be communicated via Canvas.

Course Description and Learning Outcomes

Design and implementation of digital systems, including a team design project. Topics include CAD tools, project design methodology, logic synthesis, VHDL, and assembly-language programming.

By the end of the semester, students should be able to:

- design, build, and test combinational and sequential circuits using discrete components and FPGA-based tools;
- use CAD schematic capture, simulation, and VHDL synthesis to implement digital systems;
- measure and explain digital timing behavior using oscilloscopes and logic analyzers;
- design state machines and implement a simple computer using programmable logic;
- document technical work clearly and collaborate effectively on an open-ended team design project.

Prerequisites

Formal prerequisite: ECE 2020 or CS 2110, with a minimum grade of C. Students should also have programming experience and familiarity with integrated development environments, such as the skills taught in ECE 2035 or ECE 2036.

Course Materials

Required: electronic laboratory instructions, assigned prelab readings, and the ECE 2031 workbook, made available through Canvas and the course lab website. No printed laboratory manual purchase is required.

Reference texts (optional):

- Thomas R. Collins and Christopher M. Twigg, Digital Design Laboratory Manual, 2nd ed., ISBN 978-0757571572.
- J. O. Hamblen, T. S. Hall and M. D. Furman, Rapid Prototyping of Digital Systems: SOPC Edition, ISBN 978-0387726700.
- Leslie C. Perelman, James Paradis and Edward Barrett, The Mayfield Handbook of Technical & Scientific Writing, ISBN 978-1559346474.

Course lab resources: https://powersof2.gatech.edu/labmanual. Lab hardware will be provided at the scheduled Georgia Tech-Europe laboratory sessions.

Attendance Policy

Attendance is expected at all lectures and required at scheduled laboratory sessions, lab check-offs, practicums, and examinations. Students should notify the instructor as early as possible of anticipated absences. An unexcused missed graded assessment normally receives a zero, subject to the Institute's applicable absence policies.

For an illness or personal emergency, students should follow Georgia Tech's absence-verification procedure through the Office of Student Life/Dean of Students. Medical documentation should be provided to that office, not directly to the instructor. When an absence is appropriately verified, reasonable make-up work or an alternative assessment will be arranged when feasible and in accordance with Institute policy.

Grading Policy

Component	Weight
Lab reports	25%
Prelab quizzes	25%
One or more laboratory practical exercises	10%
Final team design project	20%
In-class written exams (Exam 1: 10%; Exam 2: 10%)	20%

Final grades are based on stated assessment criteria and rubrics, not on students' rank within a lab section. Unless explicitly amended in writing, the letter-grade thresholds are A = 90–100%; B = 80–<90%; C = 70–<80%; D = 60–<70%; F = <60%. Results and rubrics will be provided through Canvas.

Examinations and Practical Assessments

Both written exams are closed-book and closed-note. The laboratory practical assessment is open-book and open-note, unless otherwise indicated in its advance instructions. Electronic communication devices must be switched off and put away during all exams. The tentative dates are indicated in the weekly schedule.

Open Lab

Additional supervised laboratory access, if available, will be announced through Canvas. Completion of laboratory work should not depend on unscheduled open-lab hours.

Final Assessment and Final Instructional Days

There is no traditional sit-down final examination. The final project report is the alternative final assessment for ECE 2031. It will be due during the official final examination period (April 29–May 5, 2027), at the course's approved final-assessment deadline, to be published in Canvas once the official exam schedule is confirmed. No other assessment is due during the final examination period.

Final project demonstrations and oral presentations are scheduled as graded project activities during the final instructional class days (April 26–27, 2027), subject to the confirmed lecture/lab timetable. If a scheduled course session does not fall on those dates, the presentations and demonstrations will take place during April 19–23. These project deliverables are listed here from the start of the semester. No tests or quizzes will take place on April 26–27, and no graded activities will take place during reading periods.

Academic Integrity

Students must comply with the Georgia Tech Academic Honor Code. Unauthorized collaboration, copying, plagiarism, falsification of results, or permitting another student to copy submitted work are prohibited. Suspected violations will be handled under the Institute's academic-integrity procedures.

Academic Honor Code: https://policylibrary.gatech.edu/academic-affairs/academic-honor-code

Collaboration

Students may discuss concepts and cooperate on physical laboratory activities with their assigned partners. Unless a task is explicitly designated as a group deliverable, prelab work, quizzes, lab reports, homework, simulations, and exams must be completed and submitted individually. The final design project is a team project: its proposal, implementation, demonstration, oral presentation and written team report may be prepared collaboratively, with individual contributions identifiable. The specific deliverable instructions and grading rubric will be posted on Canvas.

Student–Faculty Expectations and Accessibility

Students and instructors are expected to maintain a respectful learning environment and follow the Georgia Tech Student–Faculty Expectations Agreement. Grading criteria, course requirements and permissible collaboration will be communicated clearly.

Student–Faculty Expectations Agreement: https://catalog.gatech.edu/rules/21/

Students who need accommodations should contact the Office of Disability Services (ODS) and provide the instructor with the relevant accommodation letter in a timely manner. Students and the instructor will coordinate approved accommodations for laboratory activities and assessments.

Office of Disability Services: https://disabilityservices.gatech.edu/

Important Dates — Georgia Tech-Europe Spring 2027

- Tuesday, January 12 — mandatory orientation in the morning; first classes begin in the afternoon.
- March 1–5 — spring break (no classes).
- Friday, March 26 and Monday, March 29 — bank/Easter holidays (no classes); Friday, April 2 is a class day.
- Monday–Tuesday, April 26–27 — final instructional class days (no written tests or quizzes).
- Wednesday, April 28 — full reading day; April 29 and May 4 have partial reading periods, 8:00–14:40.
- April 29–30 and May 3–5 — official final examination/alternative assessment period, subject to the assigned schedule.

Tentative Weekly Schedule

This schedule is based on 15 teaching weeks, excluding spring break. Exact lecture/lab meeting times, assessments and any required holiday adjustments will be confirmed on Canvas during the first week.

Week	Dates	Lecture	Laboratory / Project
1	Jan 12–15	Introduction	No lab
2	Jan 18–22	Computer-Aided Logic Design	Lab 1
3	Jan 25–29	Discrete Circuits	Lab 2
4	Feb 1–5	Circuit Characteristics	Lab 3
5	Feb 8–12	State Machines (SMs) and VHDL I	Lab 4
6	Feb 15–19	Review / Written Exam 1	Lab 5
7	Feb 22–26	VHDL II and Sequential Timing	Lab 6
8	Mar 8–12	Train Lab	Lab 7
9	Mar 15–19	Simple Computer I	Lab 8
10	Mar 22–26	Simple Computer II	Lab 9
11	Mar 29–Apr 2	Practical Exam Review	Laboratory practical exam

Week	Dates	Lecture	Laboratory / Project
12	Apr 5–9	Final Project Introduction	Project work / proposals
13	Apr 12–16	Proposals / Written Exam 2 review	Project work / design review
14	Apr 19–23	Written Exam 2 / Presentation & Report Tips	Project work / design summary
15	Apr 26–27	Final project presentations	Project demos / oral presentations