COMPUTER ENGINEERING – VLSI & INTEGRATED CIRCUITS CONCENTRATION CURRICULUM GUIDE

Fall 2022 – Spring 2023

1. REQUIRED TOTAL CREDITS

Computer Engineering – VLSI and Integrated Circuits Concentration: 126 credits

A minimum of 42 upper-division semester credits (300-400 level) are required of all students completing a bachelor's degree program at CSU. A minimum of 30 upper-division semester credits must be completed in residence at CSU as a major in the College of Engineering. Elective credits taken at the 500-level may be used to fulfill this requirement. Courses at the 600-level may not be used to fulfill undergraduate degree requirements per CSU Policy.

2. GRADE REQUIREMENTS

University – 2.00 Cumulative GPA

All-University Core Curriculum (AUCC) – 2.00 GPA

College of Engineering – 2.00 GPA in all required engineering, math, chemistry and physics courses.

ECE Courses – 2.00 GPA in all ECE courses

ECE Department – ECE courses **required for the major** at the 100, 200, and 300 level must be passed with a minimum grade of C; grades below a C will require the student to retake the course. Students receiving a grade below C will not be allowed to take any ECE course for which that course is a prerequisite until such time as the minimum grade of C requirement is met.
ECE courses designated as an elective are exempt from the C or higher minimum grade requirement.

All course prerequisites for 100-, 200-, 300- and 400-level required ECE courses must be completed with a C or higher. This includes all ECE and MATH prerequisite courses including MATH160, MATH161, MATH261, and MATH340.

For courses taken outside of the ECE department, students must meet all grade minimums and prerequisites set by the department sponsoring the course.

All courses must be taken for a grade. The original grade and grades earned in repeated courses are used in calculating grade point averages unless a student exercises the Repeat/Repair policy: https://registrar.colostate.edu/academic-resources/repeat-delete/.

3. TECHNICAL ELECTIVES – 4-7 credits

Courses used to fulfill the major requirements will not be counted as technical elective credit. Students are required to satisfy all course prerequisites and requirements. Choose from the list of courses found on the Computer Engineering Technical Elective list: https://www.engr.colostate.edu/ece/undergraduates/degree-programs/computer-engineering-undergrad/.

Alternative courses may be taken with prior written approval of the ECE Curriculum Committee. Submit the *Request for Waiver or Substitution of ECE Department Graduation Requirements* to the department academic advisor to request approval: https://www.engr.colostate.edu/ece/undergraduates/advising/. Students must attach an explanation of

their request and supporting documentation (i.e. course syllabus for the transfer course, communications/emails regarding course evaluations, etc.).

4. COMPUTER ENGINEERING ELECTIVES – 0-3 credits

Computer engineering elective credits may be satisfied by completing courses listed on the ECE website: https://www.engr.colostate.edu/ece/undergraduates/degree-programs/computer-engineering-undergrad/

5. ALL-UNIVERSITY CORE CURRICULUM (AUCC)

All CSU students share a common learning experience and incorporate AUCC courses. The specific courses listed below are required for the ECE curriculum while satisfying AUCC requirements. In some cases, the credits exceed the AUCC minimum requirements for core curriculum credits.

All-University Core Curriculum	***Credit Requirement***	***ECE – REQUIRED AUCC Course***
Category 1 – Basic Competencies A – Intermediate Writing	3	CO150 (Honors Program students substitute HONR193)
B – Mathematics	3	MATH160
C – Diversity, Equity, and Inclusion	3	Choose from list available in the current General Catalog or Class Schedule
Category 2 – Advanced Writing	3	CO301B ***OR*** JTC300
Category 3 – Foundations & Perspectives A – Biological/Physical Sciences	7	PH141 ***AND*** Choose a minimum of 3 credits from list on the ECE website
B – Arts & Humanities	6	CS150B ***AND*** Choose from list available in the current General Catalog or Class Schedule
C – Social/Behavioral Sciences	3	ECON202
D – Historical Perspectives	3	Choose from list available in the current General Catalog or Class Schedule

6. CAREER DEVELOPMENT SEMINARS

The ECE curriculum has been modified as part of the Revolutionizing Engineering Departments initiative (RED). Three threads run through the new curriculum: Foundations, Creativity and Professional Formation of Engineers. This curriculum incorporates skills that engineers need beyond technical expertise, in areas like communication, ethics, social impact and teamwork. To augment the professional formation thread, students must also complete the following Career Development Seminars (CDS) to fulfill ECE department graduation requirements:

- Resume Writing Workshop – Resume Review
- Behavior Based Interviewing Workshop – Mock Interview
- Using LinkedIn Workshop – LinkedIn Profile Review

Session schedules, student attendance, and requirement completion is tracked via Handshake: https://career.colostate.edu/handshake/. Handshake connects students and alumni with employers through online job/internship postings, job/internship interviews, career events, and more.

7. TRANSFER COURSEWORK

Students who wish to seek transfer credit from another institution for an ECE course or major requirement should contact their academic advisor. ECE faculty who teach the course for the proposed equivalency or substitution will evaluate course materials provided by the student (i.e. course syllabus, course description, and other documentation) to determine if equivalency or substitution is warranted. If the course is outside of the ECE department (CS, PH, MATH, etc.), the student must work with the department sponsoring the course to get the course materials evaluated.

Students must submit the *Request for Waiver or Substitution of ECE Department Graduation Requirements* form to the ECE department academic advisor to request approval: https://www.engr.colostate.edu/ece/undergraduates/advising/. Students must attach an explanation of their request and supporting documentation (i.e. course syllabus for the transfer course and CSU course, communications/emails regarding course evaluations, etc.).

8. INTERNSHIPS & CO-OPS

Internships and Co-ops (Cooperative Education Programs) allow students to further explore their chosen engineering discipline, build a powerful resume, develop a network of professional contacts, and help support their academic expenses. Internships are not credit bearing and do not have an academic component. The College of Engineering encourages students to complete an internship experience and a high percentage of students choose to participate in at least one internship.
For approved Co-ops, students work at least one year with the same employer over at least 3 semesters. Students gain three academic credits that can be used as technical electives and students are required to pay tuition for the credits.

For more information on internships and Co-ops, please go to the Engineering Success Center website located at: https://www.engr.colostate.edu/engineering-success-center/co-op/

9. ACCELERATED MASTER'S PROGRAM – AMP (Accelerated B.S./M.S. or B.S./Ph.D.)

Exceptional undergraduate students may be recruited to the accelerated bachelor's/master's or bachelor's/doctoral degree programs. Students completing the Computer Engineering VLSI and Integrated Circuits concentration enrolled in AMP may double count up to nine (9) 500-level credits with a grade of B or better toward both their bachelor's/master's or their bachelor's/Ph.D. degrees. For more information on application procedures/requirements and minimum GPA requirements, please contact Katya Stewart-Sweeney, ECE Graduate Advisor, at katya.stewart-sweeney@colostate.edu.

10. OPEN OPTION PROJECT (OOP) and VERTICALLY INTEGRATED PROJECT (VIP)

Open Option Project (OOP) allows students to work on a project they have developed or work on an ECE Department/customer proposed project. OOP is open to all freshman, sophomore, junior and post ECE401/402 students. Students will work on teams to submit a project proposal, a final report at the end of the term, and participate in the project expo each term (held with ECE202 project demos in spring). In addition, students will participate in different workshops throughout the term including soldering techniques, Arduino skills, Raspberry Pi, PCB layout and using 3D printers. Students can take OOP as either ECE395B (Science/Math/Engineering) or ECE495B (Technical Elective) for one (1) credit per term for a maximum of three (3) credits (a maximum of three (3) credits of ECE395 and ECE495 combined can count toward major requirements).

Vertically Integrated Project (VIP) allows both students and faculty to fully participate in innovation by enabling the creation and long-term operation of large, multidisciplinary teams consisting of undergraduates, graduate students and faculty. Students will explore and develop comprehensive applications of electrical and computer engineering technologies as a member of a team, especially as they relate to active research areas of CSU faculty members. Students can take VIP as either ECE395C (Science/Math/Engineering) or ECE495C (Technical Elective) for one (1) credit per term for a maximum of three (3) credits (a maximum of three (3) credits of ECE395 and ECE495 combined can count toward major requirements).

11. COURSE PREREQUISITES

Students are responsible for knowing and fulfilling the requirements for course prerequisites, co-requisites, and graduation. These requirements are listed in the General Catalog and each semester's course schedule located on RAMweb.