LASERS & OPTICAL ENGINEERING CURRICULUM GUIDE

Fall 2018 - Spring 2019

1. REQUIRED TOTAL CREDITS

Lasers & Optical Engineering concentration: 125-126 credits

A minimum of 42 upper-division semester credits (300-400 level) is required of all students completing a bachelor's degree program. 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, no exceptions! A minimum of 30 upper-division semester credits must be completed in residence at CSU as a major in the College of Engineering.

2. GRADE REQUIREMENTS

University – 2.00 GPA

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

ECE Department – 2.00 GPA in all ECE courses. Every 100-, 200- and 300-level required ECE course must be passed with a minimum grade of C. Students receiving a grade below C will not be allowed to take an ECE course for which that course is a prerequisite until such time as the minimum grade of C requirement is met.

All course prerequisites for 100-, 200-, 300- and 400-level required ECE courses must be completed with a C or better. This includes all ECE, MATH, CS and PH prerequisite courses including MATH160, MATH161, MATH261, MATH340, PH141 and PH142.

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/Delete policy explained in the *Academic Standards and Policies* section of the General Catalog. Only then will the most recent grade of a repeated course be used in calculating the ECE GPA.

3. SCIENCE /MATH/ENGINEERING ELECTIVES (SME) - 3 credits

Courses used to fulfill major requirements will not be counted as Science/Math/Engineering elective credits. Students are required to satisfy all course requirements. Choose from the list of courses found on the Electrical Engineering SME list:
http://www.engr.colostate.edu/ece/pdfs/current_students/lo_science_math_engineering_technical_electives.pdf

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:
http://www.engr.colostate.edu/ece/pdfs/current_students/graduation_waiver_or_substitution_request.pdf. 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. TECHNICAL ELECTIVES IN LASERS AND OPTICAL ENGINEERING - 12 credits

Courses used to fulfill requirements in the concentration will not be counted as technical elective credits. Students are required to satisfy all course requirements. Choose from the list of courses found on the Electrical Engineering Technical Elective list: http://www.engr.colostate.edu/ece/pdfs/current_students/lo_technical_electives.pdf

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: http://www.engr.colostate.edu/ece/pdfs/current_students/graduation_waiver_or_substitution_request.pdf. 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.).

5. ALL-UNIVERSITY CORE CURRICULUM (AUCC)

All CSU students share a common learning experience. Each baccalaureate program of study must incorporate the following elements. 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
Category 2 – Advanced Writing	3	CO301B ***OR*** JTC300
Category 3 – Foundations & Perspectives		
A – Biological/Physical Sciences	7	PH141 ***AND*** PH142
B – Arts & Humanities	6	Choose from list available in the current General Catalog or Class Schedule (No more than 3 credits of intermediate foreign language will be counted in this category)
C – Social/Behavioral Sciences	3	ECON202
D – Historical Perspectives	3	Choose from list available in the current General Catalog or Class Schedule
E – Global & Cultural Awareness	3	Choose from list available in the current General Catalog or Class Schedule

4. 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 interaction in large,

diverse groups. As a part of the ECE department graduation requirements, students must complete the following Career Development Seminars as part of the Professional Formation of Engineers thread:

- Resume Writing
- Mock Interviewing or Behavior Based Interviewing
- Using LinkedIn

These sessions should be recorded in the College of Engineering's Career Readiness Program tracking system. To view the schedule and sign up for Career Development sessions, please go to: https://www.engr.colostate.edu/students/current-students/undergraduate/pli-register.php.

6. 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. Students must then complete and pass a competency exam for ECE courses required in the major. 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: http://www.engr.colostate.edu/ece/pdfs/current_students/graduation_waiver_or_substitution_request.pdf. Students must attach an explanation of their request and supporting documentation (i.e. passing of the competency exam, course syllabus for the transfer course and CSU course, communications/emails regarding course evaluations, etc.).

7. INTERNSHIP & 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 Co-ops, students work at least one year with the same employer over at least three (3) semesters. Students gain three (3) 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: http://www.engr.colostate.edu/engineering-success-center/

8. IDP+ (Accelerated B.S./M.S. or B.S./Ph.D. Program)

Exceptional undergraduate students may be recruited to the integrated bachelor's/master's or bachelor's/doctoral degree programs (IDPs - Integrated Degree Programs). Students completing the Lasers & Optical Engineering concentration enrolled in IDP+ may double count up to five or six (5-6)

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 Karen Ungerer at karen.ungerer@colostate.edu.

9. OPEN OPTION (OOP) & VERTICALLY INTEGRATED (VIP) PROJECTS

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. Student 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 total of 3 credits of ECE395 and ECE495 combined can count toward major requirements).

Vertically Integrated Project (VIP) groups students ranging from sophomores to seniors on the same project for multiple semesters. 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. The VIP program 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 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 total of 3 credits of ECE395 and ECE495 combined can count toward major requirements).

10. 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.

- The Math department policy is that prerequisites must be satisfied by the first day of class.
- The CS department requires C or better grades in all pre-requisite CS courses. If a student receives a grade less than C in a CS course, they must retake the course to continue on with additional CS courses.