engineering Physics

Undergraduate Advising Guide

Academic Year 2022-2023

Physics
UNIVERSITY OF COLORADO **BOULDER**

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Introduction

The purpose of this guide is to assist undergraduate students majoring in Engineering Physics (EPEN) to fulfill the curriculum requirements for the Bachelor of Science (BS) degree. In order to earn a Bachelor's degree in Engineering Physics, students must complete the curriculum described later in this document. (Some variations may be possible; see an Engineering Physics faculty mentor). In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science. Specifically included in the general requirements is the achievement of a GPA of at least 2.00 in the student's physics courses.

The EPEN Bachelor of Science degree program rules and requirements are subject to annual revision and changes. These program rules apply to all undergraduates enrolled in the program, regardless of the date when they first enrolled in the program. However, no student can be denied credit for any courses that were previously required or allowed in the program, provided that those courses were taken after the student had been admitted to the EPEN program and the student has been continuously enrolled.

The student is responsible for adherence to the EPEN curriculum rules and requirements and should be aware that deviation from the planned sequence of courses may result in delayed graduation.

Engineering Physics Mission Statement

Our mission is to prepare students for exciting research, development, and entrepreneurial careers in many frontier areas of engineering including quantum devices, ultra-fast lasers, adaptive optics, cryogenic electronics, computer simulation of physical systems, solar cells, magnetic storage technology, micro-mechanical systems, and molecular electronics. We achieve this through a high quality undergraduate education in the core theoretical subjects of mechanics, electricity and magnetism, thermal physics, and quantum mechanics that are supplemented by courses in mathematics, computation, and laboratory technique. The program can be tailored to a student's interests through electives in engineering, physics, or other sciences.

Engineering Physics Overview

The College of Engineering and Applied Science, in cooperation with the College of Arts & Sciences, offers two different Engineering Physics degree plans.

1) The Department of Physics Plan 4 leads to a Bachelor of Science degree in four years. The purpose of this plan is to give the engineering student thorough and fundamental training in physics and its applications. With this preparation, a student can proceed to graduate work or to professional employment.

2) A bachelor's-accelerated master's program with a BS in Engineering Physics and an MS in Physics. Students with strong academic records who plan to continue in the Graduate School for a terminal Master's in the same discipline may find it advantageous to apply for admission to the bachelor's-accelerated master's degree program. For more information, please see the Director of the Engineering Physics program or visit: https://www.colorado.edu/physics/academics/undergraduate-students/bachelors-accelerated-masters-degree

The BS in Engineering Physics is not accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Students who plan to become registered professional engineers should check the requirements for registration in their state before choosing their major.

Employment Opportunities for Engineering Physics Graduates

Engineering Physics provides students with a broad exposure to the basic physical theories and mathematical techniques underlying engineering. The program may be specialized to meet the student's interests through engineering electives. Most students become involved in laboratory research, and graduates find opportunities in optics, electronics, magnetics, and other hardware-based job markets. The program also provides excellent preparation for graduate study in physics, applied physics, and other areas of the natural sciences and engineering.

Engineering Physics Curriculum

During the freshman and sophomore years, students receive a broad introduction to physics, chemistry, applied mathematics, and mathematical methods in physics. Starting in the sophomore year, students take electrodynamics, quantum mechanics, classical mechanics, and mathematical methods, thermodynamics and statistical mechanics, and advanced mathematics. In addition, there is a core of four laboratory courses that students take. Laboratory courses emphasize student-developed and student-designed independent projects where students use the knowledge acquired to build apparatus of their own choosing. There are two possible capstone lab courses. The Advanced Laboratory (PHYS 4430) provides students with hands-on experience with optical spectroscopy, nuclear magnetic resonance, scanning tunneling microscopy, and laser cooling and trapping of atoms, among other experiments. The Quantum Forge I and II (PHYS 4700/4710) prepares students to enter the STEM workforce with a focus on quantum science and engineering. The program encourages the formation of student research collaborations with faculty in the pursuit of senior thesis projects.

Academic Advising Policy

Your Academic Advisor and Faculty Mentor are here to help you with whatever questions and problems you may have along the way to obtaining your Engineering Physics degree, but ultimately you have the responsibility to ensure you are satisfying all graduation requirements. If you have questions about career direction, curriculum requirements, department policies and requirements, or course sequences, contact your Academic Advisor and Faculty Mentor.

Advising Required Every Semester

Advising is an ongoing activity and it is mandatory that you consult your Engineering Physics Faculty Mentor and your Academic Advisor each semester as you make decisions on which courses to take the next semester. You will not be allowed to register until your advising holds are lifted. A specific faculty mentor will be assigned to you, but you may meet with any faculty mentor. Contact information and mentoring office hours for faculty mentors are located on the physics website: http://www.colorado.edu/physics/academics/undergraduate-students/bachelor-science-engineering-physics/epen-faculty-mentors.

Student E-mail Policy

All CU students receive an email account from the university, which is an official means of sending information to students. The official email address can be used by professors to contact students and provide course-related information. Students are responsible for frequently checking and maintaining this CU email address.

Engineering Physics utilizes an email list that includes all current undergraduates in the Engineering Physics program. It is in the student's best interest to be included on this list for important information relating to the College, events, and potential employment opportunities. Engineering Physics students are automatically subscribed to the list within the first two weeks of classes or within two weeks of declaring the major, and will remain on the list until they graduate or are no longer enrolled in Engineering Physics.

Questions

In most cases, students can find answers for questions concerning the Engineering Physics curriculum and other situations that might arise by reviewing this advising guide or by contacting a Faculty Mentor or Academic Advisor. If you have difficulty finding the answer to any question regarding the program, contact the Director of the Engineering Physics Program. For questions concerning College or University rules and policies, contact the Dean's Office in the College of Engineering and Applied Science.

Additional Advising Resources

There are many advising resources available at CU-Boulder, but students frequently do not know they exist or hesitate to take advantage of them:

University of Colorado Catalog is an important publication, which includes degree requirements for all academic departments on campus, academic standards, administrative regulations, University and College policies and procedures. For additional information visit: colorado.edu/catalog

Selected academic policies can also be found on the College of Engineering and Applied Science website at http://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies, including:

- Academic Standing
- Four-Year Graduation Guarantee
- Grading Policies / Grade Appeal Policy
- Graduation Requirements
- Humanities, Social Sciences, and Writing

Petitions

A student desiring a waiver of college policies must secure approval for this waiver through a petition procedure. The electronic petition form is located on the College of Engineering site at http://www.colorado.edu/engineering-advising/forms. It is the student's responsibility to follow up on the petition's progress and be aware of the final decision.

Transfer Credit Procedures

The University and College of Engineering have established procedures for admission of transfer students and evaluation of transfer credits. These policies are described on the undergraduate admissions website: http://www.colorado.edu/admissions/transfer.

Once a student is admitted, the Office of Admissions will perform an initial evaluation of transfer credit. The final determination of how transfer credits are applied toward degree requirements is made by the Physics Department. Only courses taken at a college or university of recognized standing with grades of C- (1.7) or better are acceptable for transfer. Credit hours should have been earned no more than 10 years prior to transferring into an undergraduate degree program at CU Boulder.

Career Services

Career Services can help students clarify career interests, values and work-related skills, explore potential careers and employers and refine job seeking, interviewing, and resume preparation skills. They host Career Fairs and Internship Fairs, sponsor resume writing workshops, and hold mock interview sessions. For additional information visit: http://www.colorado.edu/career

Grading Policies

Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite for another required course is C-. If a grade of D+ or lower is received in a course that is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C- or higher. The minimum passing grade for a course that is not specifically a prerequisite for another required course is D-. The Department of Physics reserves the right to drop students enrolled in physics courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the department if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

Pass/Fail (P/F)

The primary purpose for offering the opportunity for a student to enroll in a course for a grade of P or F rather than the standard letter grade is to encourage students to broaden their educational experience by electing challenging courses without serious risk to the cumulative grade point average. P/F credit will be permitted only for courses used as electives or for courses above and beyond degree requirements. **Students on academic probation may not elect the P/F grade option.** The college allows a maximum of six pass/fail credit hours per semester. Pass/fail hours counting toward graduation shall not exceed a cumulative total of 11 in the Engineering Physics major.

Engineering Physics permits the P/F grade option for free electives only. Students must obtain written approval in advance from an Engineering Physics faculty mentor to register for a course with the P/F grade option.

No Credit (NC)

A course taken for no credit cannot be used for fulfilling graduation requirements. Once a course has been taken for no credit it cannot be repeated for a grade. Consequently, a student must petition the College before enrolling for any course no credit. A student is still subject to course tuition and fee expenses when registering for a course with the no credit option.

College of Engineering Graduation Requirements

Failure to complete the course requirements listed below will postpone your graduation. Any exceptions or substitutions must be approved in writing by your advisor. Students should meet with their advisor no later than the first two weeks of the semester prior to their planned graduation to review their records. It is the student's responsibility to be certain that all degree requirements have been met, to fill out the online application for graduation, and to keep their advisor informed of any change in graduation plans.

To be eligible for a baccalaureate degree from the College of Engineering and Applied Science on the Boulder campus, a student must meet all of the following minimum requirements:

1. The satisfactory completion of the prescribed and elective work in any curriculum as determined by the college and the appropriate academic department/program. A student must complete a minimum number of semester hours, of which the last 45 must be Boulder coursework earned after admission to the university and the college. The minimum number of semester hours is 128 for a Bachelor of Science (BS) degree and 120 for a Bachelor of Arts (BA) degree.

2. A University of Colorado cumulative grade point average of at least 2.000 for all courses attempted (prior to December 2021 graduates, this threshold was 2.250).

3. A separately computed grade point average, Major GPA, of at least 2.000 (prior to December 2021 graduates, this threshold was 2.250). The manner in which the Major GPA is computed is to take the most recently earned grade in all courses designated by the major department/program.

4. The satisfactory completion of all Minimum Academic Preparation Standards (MAPS) deficiencies.

Note: Double degree students must obtain approval of both designated departments and colleges.

http://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements

Honors Designations

Engineering Physics students in the College of Engineering and Applied Sciences are eligible for an honors designation by earning a high cumulative grade point average (greater than 3.7), through the Engineering Honors Program, or by following the guidelines for Departmental Honors in Physics. It is possible to receive honors in more than one of these categories. For more information on honors designations in the College of Engineering and Applied Science, visit: https://www.colorado.edu/engineering-advising/get-your-degree/graduation/honors-graduation

Departmental Honors in Physics

The level of Departmental Honors that a student receives depends on two factors, GPA and the quality of the senior Honors thesis. The following GPA cut-off acts as a guideline:

GPA > 3.8 Summa Cum Laude
GPA > 3.5 Magna Cum Laude
GPA > 3.3 Cum Laude

However, a GPA of 4.0 with no Honors thesis will not earn an Honors designation, nor will a 4.0 GPA with a poor-quality thesis earn the designation of Summa or any designation at all if the quality is low enough. In addition, an especially high-quality thesis may bump a student up from one designation to another. For instance, a student with a 3.4 and a very strong thesis may earn a Magna designation. Even a Summa designation is not impossible, but such jumps are very rare.

Departmental Honors Thesis Advisor and Committee

Students are encouraged to find a faculty member from Physics or any of our associated departments (including APS, CASA and JILA or even NIST or NREL) to serve as a thesis advisor. These advisors serve to support students through their research and thesis process. Please contact the Honors Chair (the instructor of PHYS 4610/4620/4630) for important direction in finding a thesis advisor. The departmental Honors Chair must approve any thesis advisor that originates outside of physics.

Each student's Honors thesis committee is composed of three faculty members: two members from the Physics Department, one of whom must be a member of the Honors Council, and an external member from outside the Physics Department. If the student's thesis advisor does not fall into these categories, they can be added as a fourth member to the Honors thesis committee.

Honors Courses: PHYS 4610/4620/4630

To graduate with a Departmental Honors in Physics designation, students should enroll in at least one semester of Physics honors (PHYS 4610/4620/4630), although two or three are more usual. Due to the dependence of the Honors designation on GPA, PHYS 4610/4620/4630 are controlled enrollment courses. Students need to contact the Honors Chair (the instructor of these classes) to be admitted to the class. Typically, students will be enrolled only if their GPA lies above the 3.3 minimum. Enrollment with a GPA slightly below 3.3 will be considered on a case-by-case basis.

All students are required to attend a once a week, hour-long Honors class. These classes are designed to help guide students through the Honors process. As part of these class sessions, students rotate through giving 20-minute oral presentations of their research to their peers.

Honors Research

To be eligible for Departmental Honors in Physics, a student must complete an original piece of research and write and defend an honors thesis. It is expected that Honors students will spend between 6-10 hours per week working on their Honors research. Information on how to obtain a research opportunity can be found on our Research Opportunity page: http://www.colorado.edu/physics/academics/undergraduate-students/undergraduate-research-opportunities. Faculty mentors and the Honors Chair can also provide guidance on how to find a research opportunity.

Additional Educational Opportunities

Independent Study and Undergraduate Research

These opportunities allow for individual contact with faculty and graduate students, and they provide an educational experience that cannot be obtained in the traditional classroom setting. If you wish to use Independent Study to fulfill any Engineering Physics requirement, it must be approved ahead of time by an Engineering Physics faculty mentor.

An *Independent Study Agreement* form must be completed and signed by both the student and the sponsor of the Independent Study or Undergraduate Research. The Independent Study Agreement form is available by contacting physics@colorado.edu. In most cases, students will contact faculty in an area the student is interested in pursuing.

Paid research (no course credit) may be available at the discretion of sponsoring faculty, either part-time during the academic year or full-time during the summer. It is also available from the *Undergraduate Research Opportunities Program* (UROP) in the form of an expense allowance or stipend. If interested in UROP, please visit https://www.colorado.edu/urop/. The policy of the College of Engineering and Applied Science is that no academic credit for a particular activity is allowed if a student is being paid for that activity.

Minors

A number of departments in the University offer minor programs. Participation in a minor program is optional for students pursuing a bachelor's degree. Course work applied to a minor may also be applied toward general education (core curriculum or college list) and major requirements. Students may not earn a major and a minor in the same program of study. See your academic advisor for information on declaring a minor. A minor completion form must be on record to verify minor requirements have been completed.

Double Majors and Double Degrees

It is possible for an undergraduate student to complete degree requirements for two or more majors within the College of Engineering and Applied Science, with the approval of the relevant major departments. The decision to earn more than one major in the College should be carefully weighed, since qualified students may rather consider obtaining a master's degree or participating in undergraduate research.

It is also possible to obtain the BS degree in the College of Engineering and Applied Science and a second degree from a department in another college or school of the university. Students must satisfy curricula for both programs and may need to complete additional semester credit hours above and beyond the largest minimum credit hour requirement.

Study Abroad

The Office of International Education at CU Boulder offers a variety of study abroad programs. The Study Abroad program allows students to earn course credit while exploring an interest in another culture and seeing the world. For more information about this program, visit: https://abroad.colorado.edu/

Student Societies

CU Prime is a student-driven effort led by graduate students in the Physics Department, aimed at building an inclusive and diverse community of scientists at all levels. They run biweekly talks on cutting-edge research that are understandable to intro physics students, a one-credit course on model building and what it is to be a physicist, and a mentorship program. For more information on CU Prime, please visit their website: http://www.colorado.edu/studentgroups/cuprime/

The Society of Physics Students is a student organization open to all Physics, Engineering Physics, and Astronomy majors and minors. Society of Physics Students meets once per week to discuss physics and life, relax, and enjoy some pizza. For more information, please visit: http://www.colorado.edu/physics/academics/undergraduate-students/student-organizations

The Undergraduate Women and Gender Minorities in Physics group is a community of undergraduates that host events designed for undergraduate majors. All genders are welcome! The group can be reached by emailing uWaGMiP@colorado.edu.

COSMOS (Community of Support for Marginalized Students) is a student organization aimed towards helping underrepresented minorities here in the Physics, Engineering Physics, and Astrophysics Department at CU Boulder. They aim to provide the necessary resources for students of color to be successful in earning any degree they are currently working towards. For more information, follow COSMOS on social media (Twittter - @CuCosmos, Instagram - @cuboulder_cosmos) or sign up for our listserv!

Degree Requirements for BS in Engineering Physics

The purpose of the engineering physics major is to give the engineering student a thorough, fundamental training in physics and in its applications. With this preparation a student can proceed to graduate work or to professional employment. Students intending to graduate under this program must complete 128 credit hours, including courses as detailed below.

Engineering Physics 8-semester Overview (suggested schedule only)

Freshman Year	Credits		Credits
Fall Semester	**15**	**Spring Semester**	**15-16**
APPM 1350 Calculus 1 for Engineers	4	APPM 1360 Calculus 2 for Engineers	4
CSCI 1300	4	Second Computer Science Course[1]	3-4
PHYS 1115 (or PHYS 1110) General Physics 1	4	PHYS 1125 (or PHYS 1120) General Physics 2	4
HSS Elective	3	PHYS 1140 Experimental Physics	1
		HSS Elective	3
Sophomore Year	Credits		Credits
Fall Semester	**17**	**Spring Semester**	**16**
APPM 2350 Calculus 3 for Engineers	4	APPM 2360 Diff Eq with Linear Algebra	4
PHYS 2170 Foundations of Modern Phys	3	PHYS 2210 Class. Mech & Math Methods 1	3
PHYS 2150 Experimental Physics	1	CHEM 1133 General Chem 2	4
CHEM 1113 General Chem 1	4	CHEM 1134 General Chem 2 Lab	1
CHEM 1114 General Chem 1 Lab	1	Engineering Elective	4
Engineering Elective	4		
Junior Year	Credits		Credits
Fall Semester	**16**	**Spring Semester**	**18**
PHYS 3210 Classical Mech & Math Meth 2	3	PHYS 3220 Quantum Mechanics 1	3
PHYS 3310 Principles of Elec & Mag 1	3	PHYS 3320 Principles of Elec & Mag 2	3
PHYS 3330 Junior Laboratory	2	PHYS 4230 Thermo/Stat Mech	3
Engineering Elective	3	Upper Division Math or Applied Math	3
HSS Elective	3	Physics Elective	3
General Elective	2	HSS Elective	3
Senior Year	Credits		Credits
Fall Semester	**15**	**Spring Semester**	**16**
PHYS 4410 Quantum Mechanics 2	3	Engineering Electives	8
Engineering Elective	3	Physics Elective	3
Physics Elective	3	General Elective	3
General Elective	3	HSS Elective	2
College-approved Writing Course	3		

[1] Second computer science course may include CSCI course 2000-level or above, MCEN 1025, AREN 1027, or PHYS 2600 in the third semester.

Outline of Required Courses for BS in Engineering Physics

1. Required Physics Courses (36 credit hours)

All prerequisites require a minimum grade of C-

- ☐ PHYS 1115 or PHYS 1110: General Physics 1 (4)
  Coreq., APPM 1350

- ☐ PHYS 1125 or PHYS 1120: General Physics 2 (4)
  Prereq., PHYS 1110 or PHYS 1115; Coreq., APPM 1360; normally taken with PHYS 1140

- ☐ PHYS 1140: Experimental Physics 1 (1)
  Prereq. or coreq., PHYS 1120 or PHYS 1125

- ☐ PHYS 2150: Experimental Physics (1)
  Prereqs., PHYS 1120 or PHYS 1125, and PHYS 1140; Coreq., PHYS 2170

- ☐ PHYS 2170: Foundations of Modern Physics (3)
  Prereqs., PHYS 1120 or PHYS 1125, and PHYS 1140; Coreq., APPM 2350; normally taken concurrently with PHYS 2150
- ☐ PHYS 2210: Classical Mechanics and Mathematical Methods 1 (3)
  Prereqs., PHYS 2170 and APPM 2350; Coreq., APPM 2360

- ☐ PHYS 3210: Classical Mechanics and Mathematical Methods 2 (3)
  Prereqs., PHYS 2210 and APPM 2360

- ☐ PHYS 3220: Quantum Mechanics and Atomic Physics 1 (3)
  Prereq., PHYS 3210

- ☐ PHYS 3310: Electricity & Magnetism 1 (3)
  Prereq., PHYS 2210

- ☐ PHYS 3320: Electricity & Magnetism 2 (3)
  Prereq., PHYS 3310

- ☐ PHYS 3330: Electronics for the Physical Sciences (2)
  Prereqs., PHYS 2150 and PHYS 2170

- ☐ PHYS 4230: Thermodynamics and Statistical Mechanics (3)
  Prereqs., PHYS 2210 and APPM 2360; Coreq., PHYS 3220

- ☐ PHYS 4410: Quantum Mechanics and Atomic Physics 2 (3)
  Prereqs., PHYS 3220 and PHYS 3310

2. Upper-Division Physics Electives (9 credit hours)

With a combination of research activity and upper-division physics electives selected from the list below, you can satisfy this requirement by completing one of the following options:

☐ Option 1
- ○ Research/lab elective (3-6): PHYS 4430 (3), or PHYS 4700 (3) and PHYS 4710 (3)

AND

- ○ Physics Electives (3-6) *see below for selection of physics electives*

☐ Option 2
- ○ No credit research experience (0)
  - ▪ Documentation of your accomplishments as an intern with a research group in the Physics Department or a suitable cognate department. Approval by an Engineering Physics faculty mentor is required and should be obtained in advance.

AND

- ○ Physics Electives (9) *see below for selection of physics electives*

☐ Option 3
- ○ Research credit (3-6):
  - ▪ PHYS 4610/4620/4630: Physics Honors (2) (may be repeated up to three times)
  - ▪ PHYS 4840: Independent Study (1-3)

AND

- ○ Physics Electives (3-6) *see below for selection of physics electives*

Selection of Upper-Division Physics Electives

Note: Choose from the following. Selection of course offerings changes each semester.

☐ PHYS 3070: Energy and the Environment (3)
☐ PHYS 3090: Intro to Quantum Computing (3)
☐ PHYS 4150: Plasma Physics (3)
☐ PHYS 4340: Intro to Solid State Physics (3)
☐ PHYS 4420: Nuclear and Particle Physics (3)
☐ PHYS 4430: Advanced Laboratory (3)
☐ PHYS 4450: History and Philosophy of Physics (3)
☐ PHYS 4460: Teaching and Learning Physics (3)
☐ PHYS 4510: Optics (3)
☐ PHYS 4550: Cells, Molecules and Tissues: A Biophysical Approach (3)
☐ PHYS 4560: Introduction to Biophysics (3)
☐ PHYS 4610/4620/4630: Physics Honors (2)*****
☐ PHYS 4700: Quantum Forge I (3)
☐ PHYS 4710: Quantum Forge II (3)
☐ PHYS 4810: Special Topics in Physics (3)
☐ PHYS 4840: Independent Study (1-3)*****
☐ Any PHYS 5000-level or above graduate level courses, with permission of instructor

***Maximum of 6 credit hours from a combination of PHYS 4610/4620/4630 and PHYS 4840 can be counted for Physics Electives.**

3. Required Chemistry Courses (10 credit hours)

- ☐ CHEM 1113: General Chemistry 1 (4)
- ☐ CHEM 1114: General Chemistry 1 Lab (1)
- ☐ CHEM 1133: General Chemistry 2 (4)
- ☐ CHEM 1134: General Chemistry 2 Lab (1)

4. Required Mathematics Courses (19 credit hours)

- ☐ APPM 1350: Calculus 1 for Engineers (4)
  Prereq., APPM 1235 or Math Readiness placement into Calculus
- ☐ APPM 1360: Calculus 2 for Engineers (4)
  Prereq., APPM 1350 with a minimum grade of C-
- ☐ APPM 2350: Calculus 3 for Engineers (4)
  Prereq., APPM 1360 with a minimum grade of C-
- ☐ APPM 2360: Introduction to Differential Equations with Linear Algebra (4)
  Prereq., APPM 1360 with a minimum grade of C-
- ☐ Upper-division Mathematics or Applied Mathematics course (3)

5. Required Engineering Courses (25 credit hours)

- ☐ Computer Science Requirement, choose one: (3-4)
  - ○ CSCI 1300: Computer Science 1: Starting Computing (4)
  - ○ PHYS 2600: Introduction to Programming and Scientific Computing (3)
- ☐ Choose one additional course from the following computer science courses: (3-4)
  - ○ AREN 1027: Engineering Drawing (3)
  - ○ CSCI 1300: Computer Science 1: Starting Computing (4)
  - ○ PHYS 2600: Introduction to Programming and Scientific Computing (3)
  - ○ MCEN 1025: Computer Aided Drawing and Fabrication (4)
  - ○ Second CSCI course at 2000-level or above (3)
- ☐ Engineering Electives (17-19)
  - ○ Any courses offered by departments in the College of Engineering and Applied Science, other than those listed above that are required. Choose from the following subject codes and courses: APPM, AREN, ASEN, BMEN, CHEN, COEN, CSCI, CVEN, ECEN, EMEN, ENEN, EVEN, GEEN/IDEN, MCEN, STAT, PHYS 1400
    Excluded: ASEN3036, ASEN3046, CHEN1211, and any other courses approved for Humanities and Social Sciences credit.

6. Humanities, Social Sciences, and Writing (18 credit hours)

Visit the College of Engineering Humanities Requirements page for more information:
http://www.colorado.edu/engineering/academics/policies/hss

- ☐ Writing (3)
    - ○ Choose one: HUEN 1010 (first-year freshmen only, Fall 2011 or later), HUEN 3100, WRTG 3030, WRTG 3035, or PHYS 3050

- ☐ Humanities and Social Sciences (15)
    - ○ 6 credits must be at the upper-division level (3000-level or higher)

7. Free Electives (11 credit hours)

- ☐ In addition to completing the above requirements, students must take at least 11 credit hours of free electives to meet the minimum 128 credit hours required for the BS degree.