ENGINEERING & APPLIED SCIENCE

The College of Engineering and Applied Science has a tradition of excellence in engineering education dating back to 1893, and we continually update and improve our programs to reflect the highest standards in teaching and learning, discovery and innovation, and community and culture. Our college is the top-ranked engineering school in the Rocky Mountain region, with 14 baccalaureate programs and 12 graduate programs.

Mission & Vision

The mission of the College of Engineering and Applied Science is to generate new knowledge in engineering and related fields and to equip students from diverse backgrounds as future leaders and responsible citizens in these fields for the betterment of individuals and society. Its vision is to be a world leader in engineering research and education, with an emphasis on integrated and discovery learning and on engineering for global society.

The college embraces the following core values:

- **Global Society**: Our innovative research programs seek to create and disseminate knowledge to improve global society in areas such as health and well-being, energy and environmental sustainability and infrastructure for both developed and developing communities. Similarly, our innovative educational programs seek to prepare graduates with not only technical knowledge and excellence, but also skills for societal leadership and global citizenship.

- **Active Learning**: We design the student experience based on engineering educational research findings that demonstrate enhanced learning through active engagement of students, both within the classroom and through personalized and team-based opportunities such as design projects, discovery learning, service learning, internships and leadership programs.

- **Inclusive Excellence**: To improve the educational experience and better serve global society, we are committed to building a culture of inclusive excellence of diverse faculty, staff and students with high ethical and performance standards.

The college seeks the following outcomes in our graduates:

- technical excellence and knowledge in modern engineering, mathematics and science
- ability to communicate effectively with diverse peoples and other cultures
- ability to think critically, analyze data and formulate and solve complex problems
- ability to contribute effectively as individuals and in multidisciplinary teams
- knowledge of contemporary issues and preparation for societal leadership and world citizenship
- desire and skills for lifelong learning and personal and professional development
- passion for serving others and commitment to sustainability

Degrees

The College of Engineering and Applied Science offers Bachelor of Science degrees in:

1. aerospace engineering sciences (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/aerospace-engineering-sciences/aerospace-engineering-science-bachelor-science-bs)
2. applied mathematics (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/applied-mathematics/applied-mathematics-bachelor-science-bs)
3. architectural engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/architectural-engineering-bachelor-science-bs)
4. chemical engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/chemical-engineering-bachelor-science-bs)
5. chemical and biological engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/chemical-biological-engineering-bachelor-science-bs)
6. civil engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/civil-engineering-bachelor-science-bs)
7. computer science (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/computer-science/computer-science-bachelor-science-bs)
8. electrical engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/electrical-engineering-bachelor-science-bs)
9. electrical and computer engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/electrical-computer-energy-engineering/electrical-engineering-bachelor-science-bs)
10. engineering physics (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-physics/engineering-physics-bachelor-science-bs)
11. engineering plus (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/engineering-plus-engineering-plus-bachelor-science-bs)
12. environmental engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/environmental-engineering-environmental-engineering-bachelor-science-bs)
13. mechanical engineering (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/mechanical-engineering/mechanical-engineering-bachelor-science-bs)
14. technology, arts and media (catalog.colorado.edu/undergraduate/colleges-schools/engineering-applied-science/programs-study/technology-arts-media/technology-arts-media-bachelor-of-science-bs)
Accreditation

The CU Boulder campus is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools. Programs numbered 1, 3–6, 8–9 and 12–13 are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. Engineering Plus is a new degree program for which ABET EAC accreditation will be sought. The Computer Science degree is accredited by the Computing Accreditation Commission of ABET http://www.abet.org. The degrees in applied mathematics and engineering physics are offered in cooperation with the departments of Department of Applied Mathematics (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/applied-mathematics) and Department of Physics (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/physics) in the College of Arts and Sciences (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences); accreditation by ABET is not usually sought in these areas.

Professional Registration

Professional registration is recommended for all fields of engineering in order to protect the health, safety and welfare of the public. Registration is required in all states for the legal right to practice professional engineering. Although there are variations in state laws regarding engineering licensure, there is a general four-step process for licensure candidates: earn a degree from an EAC/ABET-accredited engineering program, pass the FE exam, gain acceptable work experience under the supervision of a PE, and pass the PE exam. Students typically take the FE exam during their senior year in college.

Centers & Communities

BOLD Center

The BOLD (Broadening Opportunity through Leadership and Diversity) Center focuses the college’s inclusion-centered access, retention and performance initiatives. The BOLD Center creates a vibrant and inclusive community of students from a wide range of backgrounds, preparing engineers with diverse perspectives to be innovative leaders in a global society. Through BOLD-inspired and -led initiatives, the college is dedicated to becoming a leader in attracting, preparing and expanding opportunities for students historically underrepresented in engineering—including women, racial minorities, students from low-income families and those who are the first in their family to attend college. The BOLD Center team focuses deeply on measurable outcomes to significantly improve upon historical student access, retention and performance results.

BOLDly Moving Forward. The BOLD Center achieves breakthroughs in attracting, preparing and expanding opportunities for historically underrepresented students in engineering through academic offerings that inspire and motivate student success. Building strong community among students who might otherwise feel isolated is also a BOLD key to student success. BOLD promotes student engagement, achievement and retention in engineering through a focus on community building, leadership and professional development activities, coupled with building strong academics and an expectation for achieving excellence.

Why be BOLD? Through the inclusive BOLD community, students meet and work with peers, connect with engineering student societies, tap into internships and mentoring opportunities, explore career services, acquire effective study habits and pursue volunteer opportunities. The BOLD Center offers free tutoring for all engineering students in the Student Success Center. BOLD participation scholarships are available through an application process.

For more information, visit the BOLD Center (http://www.colorado.edu/bold) website.

Mortenson Center in Engineering for Developing Communities

Engineering for Developing Communities (EDC) is an innovative program dedicated to transforming the understanding, application, and evaluation of engineering to address some of the world’s most pressing issues. The engineers of today need to work with colleagues in various disciplines from around the world to find locally appropriate solutions to global issues such as climate change, crumbling urban infrastructure, and adequate water and food supplies for a growing world population. By giving students tools in understanding systems perspectives, development theory, and contexts from local to global, the program helps create global citizen engineers capable of working in many roles in development engineering.

For more information, visit the Mortenson Center in Engineering for Developing Communities (http://www.colorado.edu/mcedc) website.

Residential Communities

The Engineering Honors Residential Academic Program, the Global Engineering Residential Academic Program, and the Quadrangle Engineering Living and Learning Community are popular community-building options for engineering students.

Engineering Honors Residential Academic Program

As a residential college (RC) housed in Andrews Hall, the Engineering Honors Program provides an educational experience that transcends the classroom and matches the unique abilities, needs and ambitions of this select group of students. The program is for students who want to help build an honors culture that cares more about learning than grades; more about maximizing opportunities than meeting minimum requirements; and more about being thoughtful, critical, engaged and intentional than being passively defined by the vague expectations of others. Central to fulfilling this mission is the Engineering Honors Program Residential College in Andrews Hall, which includes a residential faculty member, classrooms, special study spaces and the highest percentage of upper-division students living on campus.

Being part of EHP means belonging to a community that is ambitious without being competitive and committed to a wide range of goals from international development work to graduate school, from research to teaching, and from industry to service. It means living next to students already doing research, returning from summer internships, working with Engineers without Borders and applying to graduate school.

Incoming first-year students are selected to participate in the Engineering Honors Program via an online application process. Although many EHP students live in Andrews for multiple years, it is only required during the first year.

For more information about program requirements and to access the application, visit the Engineering Honors Program (http://www.cuhonorsengineering.com) website.

Global Engineering Residential Academic Program

The Global Engineering Residential Academic College opened in Fall 2013 with the mission to provide a four-year educational experience
for engineering students invested in foreign languages, culture and geopolitics as well as in global development and international design collaboration. Global Engineering emphasizes those aspects of education that take place outside the traditional classroom: belonging to a strong community, service opportunities, leadership training, peer mentoring and participating in the liberal arts. A Faculty Director in Residence is central to the community and interacts with all community members. Global Engineering is located in Kittredge Central, and includes a kitchen, special classrooms and study spaces, an engineering computer lab, a music room and multiple room designs to attract upper-division students. Students in global engineering are encouraged to speak Spanish, French and/or Russian in residence. Incoming students are selected each year via an online application process, both for incoming freshmen and for returning students on the CU Boulder Campus.

For more information and to access the application, visit the Global Engineering (http://www.globalengineeringrap.org) website.

Quadrangle Engineering Living and Learning Community
Adjacent to the Engineering Center, composed of Aden, Brackett, Cockerell and Crosman Halls, the Quad provides a supportive living environment for students studying engineering and applied sciences. Current offerings include a computer lab with engineering software, evening and Sunday drop-in tutoring, and special programs such as hands-on workshops with the Idea Forge, faculty dinners, trips to sporting and cultural events on campus and more. Students in the Quad report that they appreciate the convenient location, the additional academic resources, and always having friends in their hall to study with.

For more information, visit Housing & Dining Services’ Get Involved (https://living.colorado.edu/get-involved?qt-get_involved_main_tab=0&qt-get_involved_rap_breakdown_level=2&qt-get_involved_llcs=1/#qt-get_involved_llcs) webpage and scroll down to the Quad Engineering Living & Learning Community section.

Areas of Interest
Active Learning Program
The College of Engineering and Applied Science defines active learning as “enhancing knowledge, skills and understanding through practical experience.” The college’s goal is to provide all students with the opportunity to participate in enrichment experiences and partnerships with individual faculty and professionals in discovery, service and professional learning. Several programs are in place to financially support students engaged in undergraduate research or “discovery learning” with faculty, graduate students and research sponsors. Students seeking professional learning experiences such as internships and co-op assignments with a participating employer also typically earn hourly wages, while those pursuing service learning opportunities in the college, community or beyond could earn wages or course credit. Active learning encompasses domestic and international opportunities such as assisting developing communities through Engineers Without Borders, a national nonprofit organization started at CU Boulder.

For more information, visit the Active Learning Program (http://www.colorado.edu/activelearningprogram) website.

Colorado Space Grant Consortium
CU’s Space Grant program provides interdisciplinary students with access to space through innovative courses and real-world, hands-on space hardware programs that include short and long-duration, high altitude balloon payloads, sounding rocket payloads and low-Earth orbiting satellite missions. NASA’s Colorado Space Grant Consortium (also known as Space Grant) is part of a national program.

Space Grant students interact with engineers and scientists from NASA and industry to develop, test and fly new space technologies. All missions are entirely student run— including students in the roles of team members, team leads, systems engineers, project managers and mission operators. Students participate in programs that aid them in their future academic courses and careers.

For more information, visit the Colorado Space Grant Consortium (http://spacegrant.colorado.edu) website.

Engineering Leadership Program
The Engineering Leadership Program (ELP) provides students with course work and active learning experiences to prepare them to be leaders in their chosen careers, whether it is in an engineering field or another field such as government service, law, medicine, etc. Students in the program take leadership courses through ELP and other CU programs, attend leadership seminars sponsored by the college and learn from mentors who have experience relevant to their interests. ELP Students also design and undertake a personal leadership experience and produce a portfolio of their ELP work for review prior to graduation. Students apply to the program in their first or second year.

For more information, visit the Engineering Leadership Program (http://www.colorado.edu/engineeringleadershipprogram) website.

Engineering Study Abroad
In today’s global environment, engineers can expect to work in multilingual and multicultural teams and to engage in projects with global impact. It is therefore essential that students develop global engineering competencies alongside their technical skills, either through careful selection of globally oriented courses or through international experiences such as study abroad.

The College of Engineering and Applied Science has partnered with CU’s Education Abroad Office to provide engineering students with numerous global opportunities. Students can study engineering at more than 25 universities across six continents, and more than 1800 courses have been preapproved for engineering credit.

Additionally, the college is adding technically oriented global seminars each summer to allow students to study engineering within a global context and under the tutelage of a CU professor.

Careful planning is required to ensure that the courses taken abroad meet degree requirements and that participants stay on track for graduation. All participants in CU-approved study abroad programs remain enrolled at the university and receive in-residence credit; the pass/fail grade option is used by the college for course work taken during study abroad but is exempt from college and major department pass/fail limitations. CU financial aid, including most scholarships, can usually be applied to program costs, and special study-abroad scholarships may be available for program participants.

Engineering students interested in studying abroad must begin planning early and are advised to save as many HSS and technical elective courses as possible, as these are the easiest to transfer back to CU.

For more information, visit the college’s International Programs (http://www.colorado.edu/engineering-international) website.
Herbst Program of Humanities

The Herbst Program of Humanities enriches and broadens the education of engineering students with seminar and lecture courses in literature, philosophy, history, social issues and the arts.

In its two seminars, HUEN 1010 and HUEN 3100, class time is devoted almost exclusively to roundtable discussion of original texts in literature, philosophy, and the fine arts. These seminars have fewer than 14 students, so students can hone their critical thinking skills through reading, discussion and extensive writing. Both of these seminars satisfy the college’s writing requirement. Note: HUEN 1010 satisfies the writing requirement only when taken in a student’s freshman year.

The Herbst Program offers various lecture courses on a rotating basis. Engineering in History: The Social Impact of Technology (HUEN 1850) studies technological change and its consequences through time. HUEN 2100, HUEN 2120 and HUEN 2130 together survey science and technology from the Stone Age to the 20th century. Engineering, Science, and Society (HUEN 2210) explores the ethics and social implications of engineering practice. Special topics courses are occasionally offered (HUEN 2843 or HUEN 3843); these address subjects as varied as world folklore, the ethics of bioengineering, and the relationship between science and religion. The Herbst Program also offers summer and study abroad courses.

Clancy and Linda Herbst founded and endowed the program in 1989 and continue to sustain it; it is also supported by the Price Foundation, the Engineering Excellence Fund, CEAS and many friends and alumni.

For more information, visit the Herbst Program of Humanities in Engineering (http://www.colorado.edu/herbst) website.

Idea Forge

The Idea Forge is a flexible, cross-disciplinary collaborative space where students can imagine, design, create, and test products and solutions to meet a range of societal and customer needs. The space serves as the home for Design Center Colorado and Catalyze CU. It supports student teams working on invention and innovation as part of courses, as well as design and development driven by entrepreneurial-minded individuals and service-oriented groups. With all these students working side-by-side, the Idea Forge boosts student learning through collaborative, hands-on experience, while supporting industry interaction through scheduled workshops as well as spontaneous exchanges.

The mission of the Idea Forge is to enhance interdisciplinary creativity and synergy to develop flexible, adaptable, and practical graduates. To do this, the Idea Forge supports design from a variety of perspectives, from the most formal engineering design process to the human-centered design philosophy. By providing students the opportunity to design, build, and test their concepts, the Idea Forge builds creative confidence and promotes the formation of strong professional skills.

The Idea Forge boasts a variety of flexible spaces to achieve its mission and to fit individual student needs. These spaces fit into three categories: fabrication shops, project space, and community space. The fabrication shops provide students with the tools and equipment needed for prototyping through machining, welding, 3D printing, laser cutting, woodworking, and sewing with an additional emphasis on electronics and micro-controllers. Students learn safe, efficient use of the tools and equipment through action, by taking workshops or tackling a project. Project spaces fill the Idea Forge—students are able to find their nearest wood-topped workbench to assemble their design. The central Idea Forge Commons, an inspiring environment for teamwork and brainstorming, doubles as a project space and a community space. Just off the Commons, the Thinking Lounge community space provides students with a comfortable place to take a break. Additional community space consists of two impressive conference rooms, which are perfect for meetings with industry and community members.

For more information, visit the Idea Forge (http://www.colorado.edu/ideforge) website.

Integrated Teaching and Learning Program

The Integrated Teaching and Learning (ITL) program provides K–16 engineering education initiatives aimed at supporting the teaching and learning of hands-on, minds-on engineering curriculum so that students of all ages can imagine a future in engineering. With a focus on engineering design, undergraduate engineering students have the ability to create what they dream via modern manufacturing and electronics capabilities—reinforced through innovative engineering courses, as well as through time set aside for the creation of personal projects to expand one’s creative thinking.

Through ITL Program skill-building workshops on tools, machining, soldering, circuits, strain gauges, laser cutters, Arduino microcontrollers, LabVIEW, SolidWorks, spatial visualization and more, students become comfortable with the resources that help them do the engineering that impacts everyday life. The multidisciplinary, hands-on ITL Laboratory features two open and interactive laboratory plazas that support inquiry-based experimentation, data acquisition and analysis capability. The laboratory also hosts design studios, team work areas, active learning spaces—all designed to be used by all disciplines of CU engineering students as they do engineering.

The ITL Program’s nationally recognized K–12 engineering education program focuses on attracting and preparing more diverse and well-prepared youth to careers in engineering and technology. K–12 audiences may visit the ITL Laboratory to learn how engineering is an essential part of their lives through myriad hands-on science and engineering exhibits. K–12 teachers and students can also access the TeachEngineering digital library, a free online curricular resource supporting educators to bring engineering into their K–12 classrooms through high quality engineering lessons and hands-on activities aligned to science, mathematics and technological educational standards. Accessed by over 1.6 million unique users in the past year, TeachEngineering has become a key resource to the broad national STEM movement and the growing K–12 engineering community.

The ITL program features an innovative interdisciplinary undergraduate curriculum that includes the retention-building First-Year Engineering Projects course that engages student teams to experience the design process in a hands-on way, culminating in an end-of-semester public design expo. The ITL Program also supports the design courses that distinguish the Engineering Plus degree program.

For more information, visit the Integrated Teaching & Learning Laboratory (http://itl.colorado.edu) website.

Pre-Engineering Program

The pre-engineering program is designed to facilitate the successful transition of qualified first-year students in the College of Arts and Sciences into the College of Engineering and Applied Science. The program provides a structured pathway of CU Boulder course work combined with academic advising support from both the College of Engineering and Applied Science and the College of Arts and Sciences.
The program serves qualified first-time freshmen applicants who initially applied to the College of Engineering and Applied Science, but were alternatively offered admission to the College of Arts and Sciences pre-engineering program. Pre-engineering students prepare for a transition to the engineering college by successfully completing specific math, science and engineering courses. Minimum grade, credit, and GPA requirements must be met to secure the transition from pre-engineering to engineering. Through special registration access to select engineering courses, most students can complete engineering admission requirements in three semesters, while some may do so in as few as two semesters. The maximum length of time in the pre-engineering program for any student is four semesters, at which point the student will either be admitted to engineering or will transition into an arts and sciences major. Pre-engineering students receive dual support from advisors in both the College of Engineering and Applied Science and the College of Arts and Sciences. They are also encouraged to live on campus in engineering-affiliated living communities and actively engage in engineering student societies and organizations.

For more information, visit the Pre-Engineering Program (http://www.colorado.edu/pre-engineering) website.