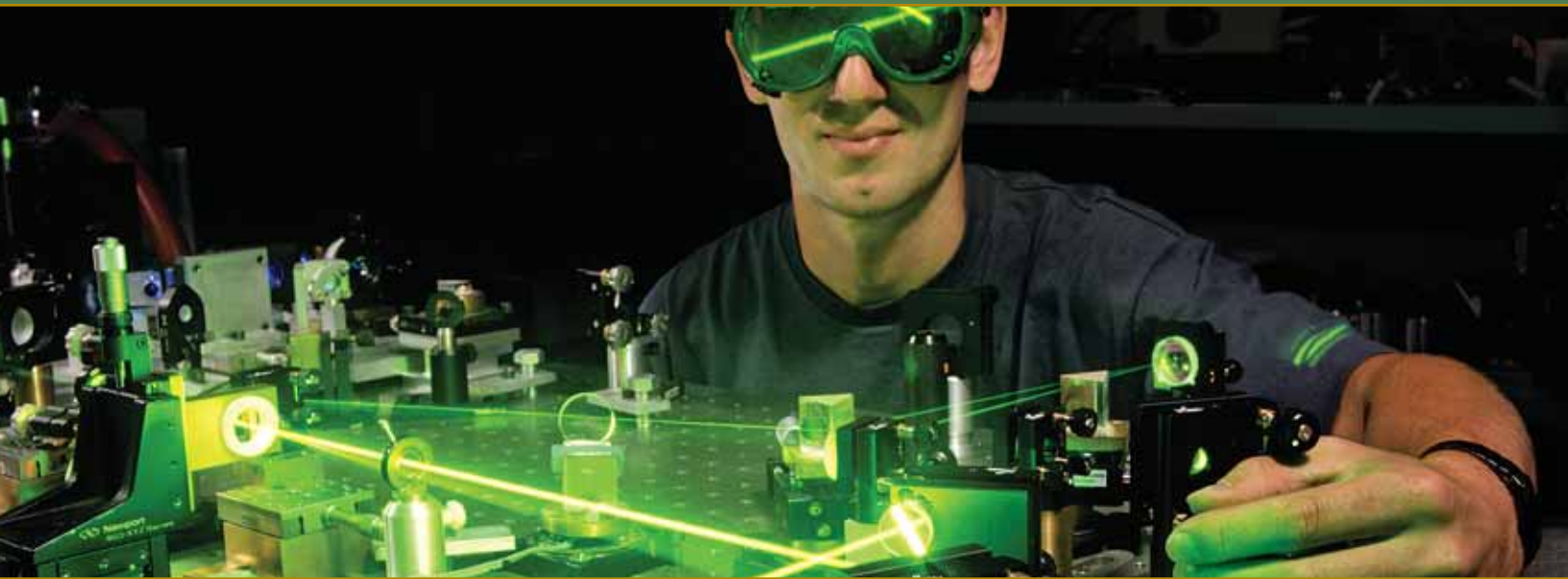


# Direction



**Engineering students at Colorado State University  
blaze trails with their studies, impacting**

*Human Health • Infrastructure • Law • Business • Space Science  
Education • Energy • Environment*



**Colorado  
State  
University**

## Have the best of both worlds, and make a global impact

Students at Colorado State University (CSU) live in the best of both worlds. They have access to strong and highly respected academic programs that prepare them for a great future. In addition, CSU is located in Fort Collins, recently named America's "Best Place to Live" by *Money Magazine* and one of the "Ten New American Dream Towns" by *Outside Magazine*. These designations reflect the wide variety of social, entertainment, and recreational opportunities available. Our location at the base of the Rocky Mountains provides students with access to outdoor recreation such as kayaking, snowboarding, and hiking. To learn more, please see our website at [www.engr.colostate.edu/academics/student\\_services/](http://www.engr.colostate.edu/academics/student_services/).



Our graduates have taken their engineering education in many directions. On the following pages see how a CSU degree can prepare you for a career that:

- 2 Improves human health
- 3 Builds the infrastructure that our society relies on
- 4 Is different from what you might expect
- 5 Contributes to solving the world's energy problems, and
- 6 Improves our global environment.

The engineering faculty at Colorado State are recognized for their dedication to undergraduate teaching and their robust research programs. Faculty and students are developing new technologies to reduce pollution and energy consumption around the world, to produce future generations of computer chips, and to improve the environment and human health. Our faculty and students work on important problems with global impact and our faculty bring that knowledge into the classroom.

The Engineering Academic Village, a new living and learning community, offers undergraduate students valuable opportunities for even greater faculty-student interaction. The Academic Village facilities include student housing, multimedia classrooms, engineering design studios, project rooms, advising offices, and a dining center. In addition, graduate teaching assistants and engineering staff live within the residence hall to provide students with support.

Colorado State's College of Engineering provides an excellent education, personalized attention, high quality academic advising, and a caring staff. Because of the quality of our students, our strong ties to industry, and one-on-one career counseling with our engineering career liaison, 100% of our last graduating class (those pursuing careers rather than graduate school) are employed in engineering.

I hope that you will make a visit to the College of Engineering at Colorado State University. There are many paths in engineering and we would like to discuss directions you might take with an engineering degree from Colorado State. To schedule a visit call 970-491-6220.

*Sandra Woods*  
Dean, College of Engineering

## Admission to the College of Engineering



In high school, focus on academic courses emphasizing English, mathematics, sciences, and social sciences, and complete

- four units of English including reading, composition, grammar, literature, and speech
- one unit each of algebra I, geometry, and algebra II, and one-half unit of trigonometry/precalculus
- three units of natural sciences including one year of either chemistry or physics
- two units of social studies including at least one U.S. or world history unit
- two foreign language units in the same language
- two units of academic electives

You'll also need to develop good study habits and strong time management skills. Students should apply early in their senior year. This allows you to be considered for scholarships and financial aid, and for residence within the Academic Village. The application for admission can be found at [admissions.colostate.edu](http://admissions.colostate.edu).

# Find a Direction:

## Engineering and Human Health

There are many ways that engineers, from all disciplines, impact human health. Here are just a few of the many ways Colorado State University students and faculty contribute to our global quality of life.

If you are interested in applying your education to improve human health, you may be interested in coupling our biomedical engineering certificate with one of our engineering degree programs. Students with interests in mechanical engineering may design prosthetics, medical implants, and medical devices that improve quality of life. Chemical engineers may develop drugs and treatments to fight disease or biosensors to provide early detection. Electrical engineers may develop technologies using lasers and medical imaging to treat and detect diseases. Regardless of where your interests lie, CSU's programs prepare you to make an impact.

Water-borne diseases are a significant problem in many developing countries. If you would like to help provide clean water throughout the world, there are many ways to do that at CSU. You may be interested in our environmental, chemical, or civil engineering degree programs or you may choose to be part of our Engineers without Borders (EWB) chapter. Our EWB students work with communities around the globe to help provide adequate and safe drinking water.

Indoor air pollution caused by using wood, coal or dung for cooking in homes is one of the leading causes of death for women and children in developing countries. More than 1.5 million people die each year from respiratory illness caused by inefficient and poorly designed cook stoves. Mechanical and chemical engineering students are working on new stove designs to reduce indoor air pollution and, therefore, reduce mortality rates in developing countries. In that last two years, CSU students have traveled to El Salvador, India, and Tanzania to develop solutions for this problem that affects billions of people globally.



*CSU seniors install a cookstove that they designed to replace fire pits used for cooking and heating in Guatemalan homes. The senior design team worked with a retired engineer and a service organization to speed stove production. There is a 10-year plan to produce 1.3 million new stoves, reducing indoor pollution and injuries to children.*



*CSU junior mechanical engineering and biomedical science double major, Dan Woldtvedt (above left), collaborated with doctoral student Wes Womack (right) to create a three-dimensional model of the cartilage in the human spinal cord. Creating the model involved dissecting cervical vertebrae, sectioning them into 1 millimeter slices, and photographing each slice. Womack wrote a mathematical code to define the cartilaginous regions on each slice in three-dimensional coordinates. Their work won Woldtvedt the 2007 Biomedical Engineering Society Undergraduate Research and Design Award.*

### Engineering Programs of Study

Biomedical Engineering (i)  
Chemical and Biological Engineering (M)  
Civil Engineering (M, c)  
    Soil and Water Resource Engineering (c)  
Computer Engineering (M)  
Electrical Engineering (M, c)  
    Lasers and Optical Engineering (c)  
Engineering Open Option (for freshmen prior to determining major)  
Engineering Science (M)  
    Engineering Physics (c)  
    Engineering Teacher Education (c)  
    International Engineering and International Studies (c)  
    Space Engineering (c)  
Environmental Engineering (M, m)  
Mechanical Engineering (M)

- (M) Major: A minimum of 27 credits in an area or discipline that together with supporting courses leads to a bachelor's degree.
- (m) Minor: A minimum of 21 credits in a core of courses, giving you insight into an area, but without the depth of a major.
- (c) Concentration: At least 12 credits that give you an opportunity to extend general learning into a more specific area.
- (i) Interdisciplinary Studies: A minimum of 20 credits that focus on an area and provide perspective from different disciplines. Although not a major, it's transcript visible, showing employers your study in the area.

### Double Majors and Minors

Engineering students have numerous options for pursuing double majors. Electrical and computer engineering students might combine their degree with one in computer science. An engineering degree could be combined with technical journalism or business administration. Students may also choose a minor. Popular minors include environmental engineering, mathematics, computer science, and foreign languages.

### Certificate Programs

Biomedical Engineering, an interdisciplinary studies program, offers a certificate similar to a minor and is open to all majors.

Engineering Education allows students to obtain an engineering degree and a teaching license in technology education. Graduates may pursue an engineering career or choose to teach engineering design principles and concepts in junior and senior high school.

# Find a Direction: Engineering and Infrastructure

## Job Placement and Internships

The engineering career liaison resides in the College of Engineering and provides individualized guidance on career planning, career exploration, job search strategies, interview preparation, and résumé writing.

The liaison works closely with employers to expand internship opportunities. 642 engineering internship listings were posted last academic year. Approximately 60% of our undergraduate students (that we know of) complete engineering internships.

Last year, 2,549 engineering job openings were posted through CSU's Career Center.

There are many opportunities for students in the community. In 2005, *Expansion Management* named Fort Collins "One of the Top Ten Metros for Scientists and Engineers Per Capita" and a "Top 15 Best Educated Workforce" in the nation.

## Engineering Career and Internship Fair

Our engineering fair is held early in the spring semester. All engineering students are encouraged to attend so they may learn more about companies and industries and explore career paths.

Last year more than 100 engineering companies recruited at the Engineering Career and Internship Fair, with many pushed to a waiting list. The college has moved to a 2-day event in order to accommodate industry demand.

The University also holds career fairs for the entire campus.



## Graduate Degrees

An accelerated bachelor's/master's program is available in mechanical and electrical engineering. Students with strong research interests may apply for admission to this combined degree program to begin their graduate program during their junior year.

Every engineering department has strong research programs and opportunities for graduate study. The College of Engineering's faculty average more than \$500,000 each in research expenditures per year, allowing them to fund students and conduct cutting-edge research.

When most people think of engineering, they picture roads, buildings, automobiles, and computer networks. Colorado State's engineering programs cover all of these areas and more.

Our students and faculty are focused on ways to keep people and property safe in extreme weather events, like hurricanes and earthquakes. Electrical engineers are testing sophisticated networks of radars in Oklahoma's "tornado alley" to improve early warning systems for tornadoes and severe thunderstorms, with the potential to save lives each year. CSU civil engineers develop new structural design codes to reduce loss of life and property. Mechanical and electrical engineers develop robotic search and rescue technologies to save lives from fallen structures caused by disasters.

Engineers at Colorado State also are focused on developing new and more efficient products. Electrical engineers improve the way data are stored and transmitted through laser and optical technology. Mechanical engineers design cars and engines, developing new technologies to reduce energy consumption and eliminate material waste. Electrical and mechanical engineers develop control systems for space vehicles and robots. Civil engineers develop land and resources in a responsible way, ensuring public safety and protecting the environment, and often participate in setting public policy. They may develop a new residential community, a large airport, or ways to improve traffic patterns. Computer engineers design electrical devices that we use daily, from MP3 players to laptops.



Colorado State is teamed with other universities and industry in the National Science Foundation Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) to develop a network of radar systems. CASA's project consists of three test beds: the first in Oklahoma's tornado alley, the second in Houston to monitor and predict floods more accurately and monitor air pollution, and the third in Puerto Rico to improve monitoring of floods produced by thunderstorms and hurricanes over complex terrain.



Innovation and its application in meeting societal and market needs is important at Colorado State. The work done in our engineering classrooms and laboratories impacts quality of life.

The NEESWood research project, led by Colorado

State, used twin shake tables to simulate a 6.7 earthquake on a three-bedroom, two-bath, 1,800-square-foot, wood-frame townhouse completely furnished, with a car in the garage and dishes on the dining room table. 250 sensors and 12 video cameras provided data that will be used to design a safer six-story wood-frame structure to be tested on the world's largest shake table in Japan in 2009.

# Find a Direction:

## Engineering and Other Professions

An undergraduate degree in engineering is a valuable foundation for careers in other professions such as law, medicine, business, teaching, and space science.

### Law

Many engineering undergraduates pursue law degrees and may choose to focus on patent law, environmental law, public policy, and intellectual property. Dan Stiles is a graduate of our civil engineering program (B.S. 2000) and an attorney. He says, "Engineers and attorneys love to use their knowledge of how and why things work to help people arrive at solutions to everyday and complex problems."

### Medicine

Many students with interests in medicine choose engineering as their baccalaureate degree. Many CSU engineering alumni have gone on to successful careers in medicine after completing their engineering degree, and in some cases, combining their degree with biomedical and premed coursework.

### Business

*Leading CEOs: A Statistical Snapshot of S&P 500 Leaders*, a report released in 2007, found that 33% of S&P 500 CEOs obtained their undergraduate degrees in engineering, with a distant second of business administration at 11%. At least 200 CSU engineering graduates currently hold the title of CEO and many of our students have started up companies based on their senior design projects at CSU. The entrepreneurial spirit is strong in the College of Engineering at Colorado State.

### Education

CSU has a great new bachelor's degree program that educates engineering students and prepares them to become teachers in middle and high school. This engineering degree, coupled with a teaching certificate, is the first of its kind in the United States.

### Space Science

Colorado State has a record of success in space science, with astronauts James van Hoften and Kent Rominger among our alumni, and partnerships with numerous aerospace companies on collaborative research projects.



*designed and assembled by a CSU aerospace-focused senior design team. The team took first place in the Project Demonstration Session at this year's Undergraduate Space Research Symposium. The device will be tested on a Japanese test rocket with the aim of keeping leftover hardware from littering space and ultimately making the technology available at a reasonable cost.*



*The key component of a new satellite tether system set to launch in 2009 was*

## Co-Curricular Opportunities

### Professional Learning Institute

With industry partners, the college designed the Professional Learning Institute (PLI) program to cover aspects of a professional engineering career that are typically not covered in engineering curricula. There are five main focus areas: global culture and diversity, innovation, leadership, public service, and ethics. All areas have been developed as a series of workshops offered each semester with guest speakers from various engineering industries.

### Undergraduate Research

Undergraduate students in the College of Engineering may work on research projects



for course credit or as hourly employees. The college operates more than 100 centers, institutes, and special research units. Students working in these labs

are involved in cutting-edge research, an invaluable undergraduate experience.

### Student Organizations

Engineering student organizations offer unique opportunities to fit your interests and field of study. You will benefit from opportunities to build leadership skills, meet guest lecturers, and participate in outreach projects. Organizations include groups from different disciplines of engineering, like the Institute of Chemical Engineers, or organizations touching all engineering disciplines like the Society of Women Engineers or Engineers Without Borders.

At the University, there are more than 300 student organizations, 16 intercollegiate sports, an active intramural sports program, and more than 300 arts events annually.

### Women and Minorities in Engineering Program (WMEP)

WMEP is dedicated to maintaining an inclusive and supportive environment for all of our engineering students. Engineering excellence through diversity is the goal of this program, and we are committed to recruiting and retaining women and people of color who are traditionally underrepresented in engineering.

# Find a Direction: Engineering and Energy

## Scholarship Opportunities

The College of Engineering has an extensive scholarship program and, in combination with the engineering departments, offers scholarships to undergraduate students worth more than \$340,000 each year. These awards are made to about 10% of the student population. The scholarships may be annual or renewable awards. Renewable scholarships range from \$2,500 to \$5,000 per year, while annual scholarships range from \$500 to \$4,000. College scholarships may be awarded in addition to University scholarships.

Freshmen who have been admitted into an engineering major are automatically considered for scholarships administered by the college.

There are no forms for scholarships administered by the College of Engineering, because we use information provided in CSU's admission application to make selections. In selecting freshmen



*Each year engineering scholarship recipients attend a luncheon to honor and meet the donor of their scholarship.*

recipients, the scholarship committee looks at the strength of the academic record (courses completed, cumulative GPA, and class rank) and standardized test results (SAT and/or ACT). Freshmen scholarship offers are mailed in early March. Scholarship programs outside of the college may require a separate application.

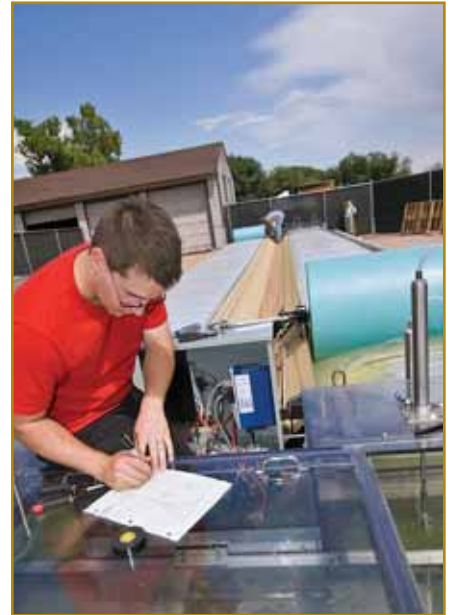
CSU Student Financial Services offers University scholarships to qualified entering students. Some are one-year scholarships while others are renewable up to a total of four years, provided the student performs at a specified minimum level and carries a full class load. Because of higher admission standards in the College of Engineering, many engineering students are offered renewable scholarships. University scholarships are awarded on a first-come, first-served basis to qualified students. Therefore, it is important to apply early for admission. Some University scholarships will require additional forms.

Colorado State recently committed to developing the CSU Green Power Project, a wind farm in northern Colorado that will generate more power than the University consumes. The wind farm furthers the University's dedication to practicing, researching, and developing clean energy solutions. The College of Engineering's commitment to clean and renewable energy is apparent.

Colorado State's engineering faculty and students are active in developing solutions to energy problems that affect our global environment. Mechanical engineers study engines, fuels, and combustion to discover new clean technologies. Chemical and mechanical engineers design alternative energy sources, such as converting algae into biodiesel.

Everyday we use energy in many forms. CSU's electrical engineers examine new and innovative ways to store and transmit energy. Electrical and mechanical engineers explore the possibility of energy independence through development of robust solar technologies at low costs. Civil engineers focus on wind and hydropower, but also study energy public policy, security, and regulation. Mechanical and civil engineers seek to reduce the energy consumption of new and existing buildings with the use of advanced control systems, energy-efficient design, solar applications, and other renewable energies. Mechanical and electrical engineers develop ways to integrate renewable energy sources into our electric grid systems that power entire communities.

If you are interested in helping to solve our global energy problem, a CSU engineering degree is great preparation.



*Solix Biofuels Inc., a startup company based in Boulder, is working with engineering students and faculty at Colorado State to commercialize technology that can cheaply mass produce oil derived from algae and turn it into biodiesel – an environmentally friendly solution to high gas prices, greenhouse gas emissions, and volatile global energy markets. They plan to commercialize the technology in the next two years and compete commercially with the wholesale price of crude petroleum.*



*AVA Solar, a new spinoff of Colorado State University,*

*has launched production of the firm's low-cost, high-efficiency solar panels. By the end of 2008, AVA is expected to produce enough solar panels to generate 200 megawatts per year, enough to power 40,000 U.S. homes. The panels are produced for less than \$1 per watt, and are expected to reduce the cost of solar electricity to about the same cost as traditionally generated electricity.*

# Find a Direction: Engineering and the Environment

For years, Colorado State has taken steps to reduce its environmental impact, converting all University facilities vehicles to biofuels, increasing recycling efforts 23 percent in the past three years, and decreasing water use 17 percent despite increases in building square footage and student enrollment. Fort Collins was also named one of the nation's most sustainable cities by the Sierra Club in 2005. In addition, the College of Engineering is well-known for research and study of environmental issues.

Colorado State's chemical engineers are headed to the Arctic to study how soil micro-organisms are affecting climate change. Electrical and computer engineers develop computational models for climate change, as well as instruments for satellites that provide measurements of the atmosphere.

Mechanical engineers reduce air pollution by creating technologies that improve engine efficiency and reduce harmful emissions from engines as small as 1 hp to as large as 2500 hp. Mechanical and chemical engineers develop clean and renewable energy alternatives to replace fossil fuels, also reducing air pollution and improving our world's health.

Civil engineers at Colorado State, in partnership with Colorado's Department of Transportation, are testing used, shredded tires mixed with soil for roadbeds and home foundations, addressing both technical and environmental problems.

Civil, environmental, and chemical engineers design programs to provide adequate and safe drinking water throughout the world. Civil engineers research, analyze, and restore rivers, streams, and lakes. Some faculty, staff, and students use large physical models in our laboratories to recreate conditions and methods in specific rivers.

If you have a passion for the protecting our environment, the possibilities for research and inquiry at Colorado State are amazing.



*A retrofit kit initially designed as a senior design project to reduce the emissions of snowmobiles is being applied to two-stroke motorcycle taxis (motorcycle school bus shown above) in Third World countries. Envirofit, an independent nonprofit company started at Colorado State in 2003, works to create and disseminate direct injection retrofit kits to reduce fuel and oil consumption by 35–50 percent and cut emissions by as much as 90 percent.*



*Student members of Engineers Without Borders traveled to La Laguneta and El Chile El Salvador to survey the topography of the communities in order to design pipelines. They tested existing wells to determine the properties of the underground aquifer, and helped the community install an electric pump for one well.*

## International Opportunities

### Study Abroad Programs

The typical duration of a study abroad program is one semester during the sophomore or junior year. Last year, CSU engineering students studied in Argentina, Australia, Chile, Czech Republic, Germany, Hungary, Japan, Spain, and the United Kingdom.



CSU coordinates study abroad programs in many countries: Argentina, Australia, Belgium, Brazil, Canada, Caribbean, Chile, China, Costa Rica, Czech Republic, Dominican Republic, France, Germany, Ghana, Hungary, India, Ireland, Italy, Japan, Jordan, Korea, Mexico, Netherlands, New Zealand, Poland, Russia, Senegal, South Africa, Spain, Taiwan, Thailand, Turkey, United Kingdom, Vietnam, plus CSU's Office of International Programs helps students access programs coordinated by other institutions.

### International Internships

The college is establishing a new program that will provide opportunities for international internships as well as bring more international students to Colorado State.

### International Engineering

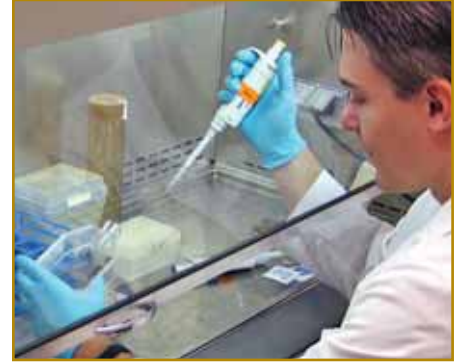
A degree concentration in International Engineering is available that results in students receiving dual degrees in the Liberal Arts and Engineering Science, including a minor in a second language.

### Engineers Without Borders

Engineers Without Borders partners with disadvantaged communities to improve quality of life through the implementation of environmentally and economically sustainable engineering projects, while developing internationally responsible students. EWB involves students in every step of the process, enabling them to learn firsthand about solutions to the problems of the developing world. CSU's student chapter of Engineers Without Borders has 50-60 members and is working on projects in India, Tanzania, Nepal, and El Salvador.

Faculty advisers are Brian Bledsoe (civil engineering), and Bryan Willson (mechanical engineering)

Web address: [www.engr.colostate.edu/ewb/](http://www.engr.colostate.edu/ewb/)



## *Join Us . . .*

for *Engineering Exploration Days* (held each October and February) to learn more about our undergraduate programs or *Engineering Graduate Student Visit Day* (held in March) to learn more about graduate studies at Colorado State.  
Call (970) 491-6220 for more details.

**Colorado  
State**  
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