

College of Engineering

Office in Engineering Building, Room 202
(970) 491-8657 or (970) 491-6220
<http://www.engr.colostate.edu>

Professor Sandra Woods, Dean
Professor Thomas Siller, Associate Dean

UNDERGRADUATE MAJORS

Chemical and Biological Engineering
Civil Engineering
Computer Engineering
Electrical Engineering
Engineering Science
Environmental Engineering
Mechanical Engineering

UNDERGRADUATE MINOR

Environmental Engineering

The mission of the College of Engineering is to provide high quality teaching, advising, research, outreach, and service in a land grant, Carnegie Class I environment and to serve the people and industries of the state, nation, and world.

Engineers are critically involved in every facet of modern technological society, processing information, designing systems and equipment, maintaining society's infrastructure, solving environmental and energy problems, and helping attain desired levels of efficiency and comfort. The College of Engineering continues its tradition – a tradition as old as Colorado State – of providing world-class training in the basic fields of engineering through both undergraduate instruction and graduate programs strongly supported by modern research facilities and distinguished faculty.

COLLEGE PROGRAMS

All engineering undergraduate programs are accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite, 1050, Baltimore, MD 21202-4012 – telephone (410) 347-7700.

Undergraduate programs are administered by the Departments of Chemical and Biological Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, and Mechanical Engineering. These departments offer four-year programs leading to a Bachelor of Science degree. Although emphasis is on broad training in basic engineering, students may specialize to some extent by proper choice of technical electives.

A program leading to a Bachelor of Science degree with a major in engineering science is coordinated by the Associate Dean for Academic Affairs in the College of Engineering. This program offers five concentrations: engineering physics, space engineering, teacher education, international engineering and international studies with a minor in a second language, and a dual degree resulting in degrees in both liberal arts and engineering.

Students may consider simultaneously completing the requirements for a second major. See Second Major Requirements in the Degree Program chapter for a complete description of the program. A student may pursue a minor program of study inside or outside the College of Engineering in conjunction with the desired engineering major.

College of Engineering General Objectives and Outcomes

Outcomes

Graduates of the undergraduate engineering programs will be able to:

- Apply knowledge of mathematics, science, and engineering,
- Identify, formulate, and solve engineering problems,
- Design and conduct experiments and analyze and interpret data,
- Design a system, component, or process to meet demand needs within realistic constraints,
- Communicate effectively,
- Function in multi-disciplinary teams, and
- Use the techniques, skills and modern engineering tools necessary for engineering practice.

They also shall have:

- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context,
- A knowledge of contemporary issues,
- An understanding of professional and ethical responsibility, and
- A recognition of the need for, and an ability to engage in, life-long learning.

Objectives

Engineering B.S. graduates will be able to do the following within the first few years after graduation:

- Identify, analyze, formulate, and solve engineering problems associated with their professional position, both independently and in a team environment;
- Manage multi-faceted and multi-disciplinary projects with significant legal, ethical, regulatory, social, environmental, and economic considerations using a broad systems perspective;
- Communicate effectively with colleagues, professional clients, and the public; and
- Demonstrate commitment and progress in lifelong learning, professional development, and leadership.

Individual program outcomes and objectives are given at the departments' websites.

International Opportunities

Study abroad programs are available to students in the College of Engineering. Because knowledge of other cultures is valuable in understanding our own, students are strongly encouraged to take a summer or semester to study outside the United States as part of their overall program at Colorado State University. Students interested in study abroad should plan far in advance by discussing opportunities with their academic adviser and by visiting the Office of International Programs in Laurel Hall or the web site <http://www.international.colostate.edu/>.

Registration as a Professional Engineer

Registration and licensing are required under certain legally defined circumstances in order to practice as an engineer. The College of Engineering actively encourages all of its students to fulfill the necessary requirements as soon as they are eligible. The Fundamentals of Engineering Examination (FE) administered by the State Board of Registration for Professional Engineers and Professional Land Surveyors may be taken by seniors from ABET accredited programs during the two semesters prior to graduation. After the required

practical experience is completed, the Principles and Practice of Engineering Examination (PE) for licensing may be taken for licensure in the engineering profession.

Professional Development

Each department maintains its own standards and program requirements for student professional development.

ADMISSION INFORMATION

Students may be admitted to a specific undergraduate major in this college or as undecided engineering freshmen (Engineering Open Option). Undecided engineering students must specify their choice of major prior to registration for the sophomore year. Should the demand for any engineering major exceed the capacity to maintain a high-quality education, the college may find it necessary to limit enrollment in some majors. The undecided engineering student who wishes to transfer to one of these majors may be at a disadvantage when demand exceeds capacity. In general, students are better served by selecting one of the college's majors at admission and then changing majors, if necessary, rather than entering as undecided freshmen.

High School Graduates

See Undergraduate Admission Policies and Procedures section in this catalog for specific College of Engineering requirements. The required units listed are minimums. Students desiring to enter the engineering majors are urged to take available advanced math, English, computer skills, and natural sciences classes.

Course Placement and Advising for Freshmen

All entering freshmen are required to take the mathematics placement examination prior to registration. The examination results, together with other information about students, are used by faculty advisers to counsel students. Those with weaknesses in mathematics may be advised to take up to five math review courses (MATH 117, MATH 118, MATH 124, MATH 125, MATH 126) before enrolling in calculus (MATH 160). Credits for these review courses may not be used toward an engineering degree.

Transfer Students

Advisers in each department are available to assist students who wish to transfer. Should the demand for any engineering major exceed the capacity to maintain a high-quality education, individual departments may find it necessary to enforce more stringent requirements.

Transfer of credits earned at other colleges and universities within Colorado is facilitated by the articulation agreements from one university to another on course equivalencies.

Change of Major to Engineering

Students who wish to change from another CSU major are selected for admission once each term; the number of students admitted is based on space availability as well as academic criteria. Some majors may specify more stringent requirements in math and science courses. Engineering courses are normally open to engineering majors only. The change of major must be initiated at the Center for Advising and Student Achievement (CASA).

CURRICULAR REQUIREMENTS

The curricula of the College of Engineering include courses in engineering, mathematics, science, humanities, and social sciences. During the first two years, all engineering students take coursework emphasizing mathematics, physics, chemistry, and basic engineering, because all branches of engineering rely on this foundation. The junior and senior years are devoted primarily to a balanced selection of specialized engineering courses. The minimum number of credits for graduation with a Bachelor of Science degree varies with the engineering major.

Good engineers are not only competent to render professional service in their fields of specialization, but are able to assume leadership roles as citizens. To broaden the students' perspectives in non-technical areas, the programs in engineering require a minimum of 12 to 15 credits in arts and humanities and behavioral and social sciences to be selected from anthropology, economics, foreign languages, history, literature, philosophy, political science, psychology, and sociology. Courses in art, geography, music, speech, and theatre may also be selected with the prior approval of the adviser. These courses must be selected in such a way that they also meet All-University Core Curriculum requirements.

The ability to express oneself clearly and concisely in both written and oral forms is a great asset to the engineer who is often called upon to prepare reports in which clarity, organization, and precision are essential. For this reason, engineering students must do more than meet the minimum English course requirements. In fact, the development of communication skills is emphasized throughout the engineering curricula. This emphasis is especially evident in laboratory and design-oriented courses, in which the presentation of both oral and written reports is a major component.

The College of Engineering requires a minimum grade point average of 2.000 in required engineering, mathematics,

chemistry, and physics courses as a graduation requirement. Additional minimum grade requirements apply in some engineering majors.

An engineer applies physical understanding and analytical techniques to the *design* of devices and systems needed by modern society. The preparation of an engineer, therefore, must include engineering design experience. To meet this objective, all undergraduate engineering students must participate in a well-structured sequence of design-related courses culminating in a capstone design experience in order to graduate.

Graduate Programs in Bioengineering

Programs leading to a Master of Engineering, Master of Science, and Doctor of Philosophy degrees are offered at Colorado State. The graduate programs in bioengineering integrate physical, chemical, and mathematical sciences with engineering principles and clinical studies. There are boundless opportunities for research, ranging from new therapies and imaging modalities for fighting cancer, to improving the design of vital medical equipment used in open heart surgery, or developing the next generation of gene therapies and engineered tissues.

At Colorado State we are uniquely positioned to offer this advanced degree program. The highly-ranked Veterinary Medical Center and the Professional Veterinary Medicine Program are co-located with engineering and sciences on the CSU campus, providing a rich environment for interdisciplinary research and day-to-day collaborations.

INTERDEPARTMENTAL MAJOR

Major in Engineering Science

Office in Engineering Building, Room 102

Engineering science is an interdisciplinary major that allows students to acquire a strong base in mathematics, the physical sciences, and engineering fundamentals while pursuing a broad background in the liberal arts or other areas of interest in preparation for specialized careers or graduate studies. The major provides comprehensive undergraduate engineering education in selected fields which are not served by traditional engineering programs available at Colorado State University. Five concentrations are available – engineering physics, international engineering and international studies, space engineering, teacher education, and the dual degree program in engineering and the liberal arts. Regardless of the concentration, graduates are well prepared for a professional career.

Educational outcomes and objectives of the engineering science major, along with additional information on this major, are given at <http://www.engr.colostate.edu/es/>.

Potential Occupations

Engineering science graduates are well rounded in mathematics, sciences, humanities, and social and behavioral sciences. They are well prepared to enter a career in engineering, or to proceed to graduate school in one of the traditional engineering disciplines. Graduates of the liberal arts/engineering science dual major often move on to professional programs in medicine, law, veterinary medicine, or business. Moreover, these graduates are suited for a broad range of occupations in addition to engineering. Participation in internships or volunteer activities is highly recommended to enhance practical training and development. Graduates who continue on with advanced studies can attain more responsible positions with the possibility of rising to top professional levels. Some examples include: space engineer, solid-state electronics engineer, and aerospace engineer.

Engineering Physics Concentration

The engineering physics concentration prepares students to work in high technology areas in which solid engineering training, combined with a broader background in physics is valuable. Through the appropriate choice of technical electives, students can specialize in modern laser physics, solid-state electronics, or energy conversion. The technical electives are chosen predominantly from the Departments of Electrical and Computer Engineering and Mechanical Engineering in the College of Engineering and the Departments of Computer Science, Mathematics, and Physics in the College of Natural Sciences.

To qualify for graduation, engineering science majors must achieve a minimum 2.000 grade point average at Colorado State in all courses in engineering, mathematics, computer science, statistics, physics, and chemistry as well as courses taken as technical electives.

Course	Title	Cr	AUCC
FRESHMAN			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CO 150 ^P	College Composition	3	1A
ECE 102	Digital Circuit Logic	4	
ECE 103 ^P	DC Circuit Analysis	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Global and cultural awareness ¹	3	3E
	TOTAL	31	
SOPHOMORE			
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
ECE 202 ^P	Circuit Theory Applications	4	
ECE 251 ^P	Introduction to Microprocessors	4	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B

Course	Title	Cr	AUCC
MECH 237 ^P	Introduction to Thermal Sciences	3	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Social/behavioral sciences ²	3	3C
	TOTAL	33	
JUNIOR			
CHEM 113 ^P	General Chemistry II	3	
CHEM 114 ^P	General Chemistry Laboratory II	1	
CIVE 300 ^P	Fluid Mechanics	4	
	OR		
MECH 342 ^P	Mechanics and Thermodynamics of Flow Processes	3	
ECE 341 ^P	Electromagnetic Fields and Devices I	3	
ECE 342 ^P	Electromagnetic Fields and Devices II	3	
PH 314 ^P	Introduction to Modern Physics	4	
PH 315 ^P	Modern Physics Laboratory	2	
	Additional communication ³	3	2A or 2B
	Arts/humanities ⁴	6	3B
	Historical perspectives ⁵	3	3D
	TOTAL	31-32	
SENIOR			
ECE 401 ^P	Senior Design Project I	3	4A
ECE 402 ^P	Senior Design Project II	3	4C
PH 353 ^P	Optics and Waves	4	
STAT 315 ^P	Statistics for Engineers and Scientists	3	
	Mathematics ⁶	3	
	Technical electives ⁷	17-18	
	Electives	5	
	TOTAL	38-39	

PROGRAM TOTAL = 134 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3E in the All-University Core Curriculum (AUCC).

² Select from the list of courses in category 3C in the AUCC.

³ Select from the list of courses in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

⁴ Select two courses from the list in category 3B in the AUCC. Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

⁵ Select from the list of courses in category 3D in the AUCC.

⁶ Mathematics elective (300 level or higher). Select course with adviser's approval.

⁷ Select courses with adviser's approval.

International Engineering and International Studies Concentration

The international engineering and international students concentration is a five-year joint program with dual degrees in liberal arts (B.A.) and engineering science (B.S.). Students in this concentration must take on an emphasis in one of the following areas: chemical and biological engineering, civil engineering, computer engineering, electrical engineering, environmental engineering, or mechanical engineering. The program prepares students to work in an international environment. Key components include:

- An engineering education which favors broadness over specialization;
- A foreign language background which helps the student to develop sufficient competency to speak and write with some accuracy and fluency.

- An opportunity to study abroad in a region of the selected language;
- A strong background in the liberal arts as it relates to the region of the selected foreign language, including an understanding of history, culture, political science, and economics.

To qualify for graduation, engineering science majors must achieve a minimum 2.000 grade point average at Colorado State in all courses in engineering, mathematics, computer science, statistics, physics, and chemistry as well as courses taken as technical electives.

Course	Title	Cr	AUCC
FRESHMAN			
CHEM 111 ^P	General Chemistry I	4	
CHEM 112 ^P	General Chemistry Laboratory I	1	
CHEM 113 ^P	General Chemistry II	3	
CIVE 102	Introduction: Civil/Environmental Engineering	3	
CIVE 103 ^P	Engineering Graphics and Computing	3	
CO 150 ^P	College Composition	3	1A
ECON 202 ^P	Principles of Microeconomics	3	3C
L* 200 ^P	Second Year Language I ¹	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	
	TOTAL	31	
SOPHOMORE			
ECON 204 ^P	Principles of Macroeconomics	3	
L* 201 ^P	Second Year Language II ¹	3	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
POLS 131	Current World Problems	3	3E
CO 300 ^P	Writing Arguments	3	2B
	OR		
JTC 300 ^P	Professional and Technical Communication	3	2B
	Technical electives ²	3	
	TOTAL	33	
JUNIOR			
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
MECH 237 ^P	Introduction to Thermal Sciences	3	
POLS 232	International Relations	3	
	OR		
POLS 241	Comparative Government and Politics	3	
STAT 315 ^P	Statistics for Engineers and Scientists	3	
	Foreign language minor ³	6	
	Historical perspectives ⁴	3	3D
	Electives from approved list ⁵	3	
	Technical electives ²	3	
	TOTAL	30	
SENIOR			
CIVE 300 ^P	Fluid Mechanics	4	
ECE 204 ^P	Introduction to Electrical Engineering	3	
ECON 370 ^P	Comparative Economic Systems	3	
	Foreign language minor ³	6	
	Technical electives ²	13-15	
	TOTAL	29-31	
FIFTH YEAR			
	<i>Select one of the following pairs of courses:</i>		
CBE 451 ^P	Chemical Engineering Design I ⁶	3	4C
CBE 452 ^P	Chemical Engineering Design II	3	4C
	OR		
CIVE 402 ^P	Senior Design Principles ⁶	3	
CIVE 403 ^P	Senior Project Design	3	4C
	OR		
ECE 401 ^P	Senior Design Project I ⁶	3	
ECE 402 ^P	Senior Design Project II	3	4C
	OR		

Course	Title	Cr	AUCC
MECH 486A ^P	Engineering Design Practicum I ⁶	4	4C
MECH 486B ^P	Engineering Design Practicum II	4	4C
	Arts and humanities ⁷	6	3B
	Foreign language minor ³	3	
	Electives from approved list ⁵	9	
	Technical electives ²	6	
	Free electives	2	
	TOTAL	32-34	

PROGRAM TOTAL = 157 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Effective Fall 2007, foreign language courses are in separate prefixes (all starting with L and followed by three letters designating the language, e.g., LFRF is French, LGER is German, etc.).

² Courses are to be selected with the approval of the engineering adviser. A minimum of 7 credits must be upper division.

³ Each student is required to complete a minor in a foreign language.

⁴ Select courses from approved list that fall into category 3D in the All-University Core Curriculum (AUCC).

⁵ The list of approved courses is available in the office of the Associate Dean for Academic Affairs, College of Engineering or in the Dean's Office, College of Liberal Arts.

⁶ Students in this concentration may need to obtain a prerequisite override from the appropriate department to enroll in this course.

⁷ Select two courses from list of courses in category 3B in the AUCC.

Space Engineering Concentration

The space engineering concentration provides students with a broad background in aerospace and space engineering. The curriculum is based on a solid foundation of engineering disciplines and applied mathematics.

To qualify for graduation, engineering science majors must achieve a minimum 2.000 grade point average at Colorado State in all courses in engineering, mathematics, computer science, statistics, physics, and chemistry as well as courses taken as technical electives.

Course	Title	Cr	AUCC
FRESHMAN			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
	<i>Select one pair of courses from the following:</i>		
CIVE 102	Introduction: Civil/Environmental Engineering	3	
CIVE 103 ^P	Engineering Graphics and Computing	3	
	OR		
MECH 102 ^P	Mechanical Engineering Problem Solving	3	
MECH 200 ^P	Introduction to Manufacturing Processes	3	
CO 150 ^P	College Composition	3	1A
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Global and cultural awareness ¹	3	3E
	TOTAL	30	
SOPHOMORE			
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
ECE 204 ^P	Introduction to Electrical Engineering	3	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
MECH 201 ^P	Engineering Design I	3	
MECH 337 ^P	Thermodynamics	4	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Historical perspectives ²	3	3D
	TOTAL	32	

College of Engineering

Course	Title	Cr	AUCC	Course	Title	Cr	AUCC
JUNIOR				FRESHMAN			
CHEM 113 ^P	General Chemistry II	3		CHEM 111 ^P	General Chemistry I	4	3A
CHEM 114 ^P	General Chemistry Laboratory II	1		CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CIVE 300 ^P	Fluid Mechanics	4		<i>Select one pair of courses from the following:</i>			
OR				CBE 101	Chemical and Biological Engineering I	3	
MECH 342 ^P	Mechanics and Thermodynamics of Flow Processes	3		CBE 102 ^P	Chemical and Biological Engineering II	3	
CIVE 360 ^P	Mechanics of Solids	3		OR			
CIVE 367 ^P	Structural Analysis	3		CIVE 102	Introduction: Civil/Environmental Engineering	3	
MECH 302 ^P	Engineering Design III ³	3		CIVE 103 ^P	Engineering Graphics and Computing	3	
MECH 307 ^P	Mechatronics and Measurement Systems	4		OR			
	Additional communication ⁴	3	2A or 2B	ECE 102	Digital Circuit Logic	4	
	Arts/humanities ⁵	6	3B	ECE 103 ^P	DC Circuit Analysis	3	
	Social/behavioral sciences ⁶	3	3C	OR			
	TOTAL	32-33		MECH 102 ^P	Mechanical Engineering Problem Solving	3	
SENIOR				MECH 200	Introduction to Manufacturing Processes	3	
<i>Select one pair of courses from the following:</i>				CO 150 ^P	College Composition	3	1A
CIVE 402 ^P	Senior Design Principles ³	3		MATH 160 ^P	Calculus for Physical Scientists I	4	1B
CIVE 403 ^P	Senior Project Design	3	4C	MATH 161 ^P	Calculus for Physical Scientists II	4	1B
OR				PH 141 ^P	Physics for Scientists and Engineers I	5	3A
MECH 486A ^P	Engineering Design Practicum I ³	4	4C		Arts and humanities ²	6	3B
MECH 486B ^P	Engineering Design Practicum II	4	4C	TOTAL		33-34	
MECH 344 ^P	Heat and Mass Transfer	3		SOPHOMORE			
MECH 417 ^P	Control Systems	3		CIVE 262 ^P	Engineering Mechanics	4	
MECH 460 ^P	Aeronautics	3		ECE 204 ^P	Introduction to Electrical Engineering	3	
MECH 468 ^P	Space Propulsion and Power Engineering	3		EDUC 275 ^P	Schooling in the United States	3	3C
STAT 315 ^P	Statistics for Engineers and Scientists	3		EDUC 340 ^P	Literacy and the Learner	3	
	Mathematics, upper division	6		MATH 261 ^P	Calculus for Physical Scientists III	4	
	Technical electives ⁷	11-12		MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
	Electives	3		MECH 201 ^P	Engineering Design I ³	3	
	TOTAL	42-43		MECH 237 ^P	Introduction to Thermal Sciences	3	
PROGRAM TOTAL = 137 credits				PH 142 ^P	Physics for Scientists and Engineers II	5	3A
				TOTAL		32	

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3E in the All-University Core Curriculum (AUCC).

² Select from the list of courses in category 3D in the AUCC.

³ Space engineering students will need to obtain a registration override from the appropriate department to take this course.

⁴ Select from the list of courses in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

⁵ Select two courses from the list of courses in category 3B in the AUCC. Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

⁶ Select from the list of courses in category 3C in the AUCC.

⁷ Select courses with adviser's approval.

Teacher Education Concentration

The engineering science teacher education concentration provides students with the engineering and teaching experience to enter junior and senior high classrooms and laboratories to teach engineering design principles and concepts in an exciting technology education classroom.

Detailed information about the Educator Licensing Program and licensure requirements are available on the program's web site (<http://soe.cahs.colostate.edu/Licensure>) or in room 100 of the Education Building

To qualify for graduation, engineering science majors must achieve a minimum 2.000 grade point average at Colorado State in all courses in engineering, mathematics, computer science, statistics, physics, and chemistry as well as courses taken as technical electives.

SENIOR				<i>Select one pair of courses from the following:</i>			
CIVE 402 ^P	Senior Design Principles ¹	3		CIVE 402 ^P	Senior Design Principles ¹	3	
CIVE 403 ^P	Senior Project Design	3	4C	CIVE 403 ^P	Senior Project Design	3	4C
OR				MECH 486A ^P	Engineering Design Practicum I ¹	4	4C
MECH 486A ^P	Engineering Design Practicum I ¹	4	4C	MECH 486B ^P	Engineering Design Practicum II	4	4C
MECH 486B ^P	Engineering Design Practicum II	4	4C	EDCT 465 ^P	Methods and Materials in Technology Education	3	
EDCT 465 ^P	Methods and Materials in Technology Education	3		EDUC 450 ^P	Instruction II-Standards and Assessment	4	
EDUC 450 ^P	Instruction II-Standards and Assessment	4		EDUC 486J ^P	Practicum-Instruction II	1	
EDUC 486J ^P	Practicum-Instruction II	1		MECH 325 ^P	Machine Design	3	
MECH 325 ^P	Machine Design	3		CO 300 ^P	Writing Arguments	3	2B
CO 300 ^P	Writing Arguments	3	2B	OR			
JTC 300 ^P	Professional and Technical Communication	3	2B	JTC 300 ^P	Professional and Technical Communication	3	2B
				<i>Global and cultural awareness⁵</i>			
				3			
				<i>Historical perspectives⁶</i>			
				3			
				<i>Social/behavioral science⁷</i>			
				3			
				TOTAL			
				29-31			
FIFTH YEAR				OR			
EDCT 492 ^P	Seminar-Professional Relations	1		EDCT 492 ^P	Seminar-Professional Relations	1	
EDUC 485B ^P	Student Teaching-Secondary	11		EDUC 485B ^P	Student Teaching-Secondary	11	

Course	Title	Cr	AUCC
EDCT 485 ^P	Student Teaching	11	
TOTAL		12	
PROGRAM TOTAL = 137-139 credits			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Students will need to obtain a registration override from the appropriate department to take this course.

² Select two courses from list of courses in category 3B of the All-University Core Curriculum (AUCC). Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.³ Students who do not take the MECH sequence in the freshman year may need to get a registration override from the Department of Mechanical Engineering to register for this course.

⁴ If planning to take MECH 486A and MECH 486B in the senior year, take MECH 302 and MECH 331; otherwise select courses with adviser's approval.

⁵ Select one course from list of courses in category 3E of the AUCC.

⁶ Select one course from list of courses in category 3D of the AUCC.

⁷ Select one course from list of courses in category 3C of the AUCC.

Liberal Arts Concentrations

The liberal arts concentration is a five-year joint program with dual degrees in liberal arts (B.A.) and engineering science (B.S.). Students in this concentration must take on an emphasis in one of the following areas: chemical engineering, computer engineering, civil engineering, electrical engineering, environmental engineering, or mechanical engineering. The program prepares students for a vast array of career options. (See the College of Liberal Arts, liberal arts major, for information on the liberal arts concentrations in engineering science.)

DEPARTMENT OF ATMOSPHERIC SCIENCE

Office in Atmospheric Science Building, Foothills Campus,
Room 117
(970) 491-8360
www.atmos.colostate.edu

Professor Richard H. Johnson, Department Head

No undergraduate major is offered. Undergraduates interested in atmospheric science at the graduate level are encouraged to major in engineering, physics, chemistry, mathematics, or atmospheric science.

Graduate Programs in Atmospheric Science

The department offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees in atmospheric science. Since the graduate degrees are primarily research degrees, the specialization opportunities for students generally reflect the research interests and expertise of the academic faculty. A description of these areas of interest may be found in the *Graduate and Professional Bulletin*, <http://graduateschool.colostate.edu/index.asp?url=catalog>

The academic curriculum and research training for atmospheric science graduate students are closely integrated. Graduates of the program typically find employment in government research laboratories, academic institutions, military services, and private industry. Students with a baccalaureate degree in mathematics, the natural sciences, or engineering are encouraged to apply for admission.

For additional information on graduate programs, interested students should write to the Department of Atmospheric Science and request *The Department of Atmospheric Science Graduate Student Guide*.

DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

Office in Glover Building, Room 100
(970) 491-5252
<http://www.cbe.colostate.edu>

Professor David S. Dandy, Department Head

Major in Chemical and Biological Engineering

Chemical and biological engineering is a powerful blend of basic sciences and the skills to quantitatively describe, predict, and control all changes of matter. This provides the foundation to create cutting-edge materials and products, to design new devices to improve health or the environment, and to design processes for the safe production of chemicals and biochemicals, the production of alternative energy sources, and prevention of hazardous waste.

The chemical and biological engineering curriculum is based on the sciences of physics, chemistry, biology, and mathematics. It includes engineering science and design methods, as well as humanities and social sciences. Students can pursue interdisciplinary studies programs or minors. Popular options include minors in chemistry, mathematics, and environmental engineering, and interdisciplinary studies programs in biotechnology and biomedical engineering. The curriculum is well-aligned to meet pre-health profession requirements.

The chemical and biological engineering program provides an environment that promotes a sense of professionalism, the development of project management skills, and an appreciation for the value of life-long learning. Graduates of our program are well prepared to enter a variety of professions, or to pursue further education. The broad, strong scientific basis of chemical and biological engineering has kept our graduates consistently near or at the top in salary and demand among B.S. graduates.

Educational outcomes and objectives of the chemical and biological engineering major, along with additional information on this major are given at www.cbe.colostate.edu.

Potential Occupations

Chemical and biological engineering graduates find employment with the biotechnology, biomedical, microelectronics, environmental, consulting, alternative energy, petroleum, chemical, food, pharmaceutical, and other private sector industries and with government agencies. Participation in internships, volunteer activities, or cooperative education opportunities is highly recommended to enhance practical training and development. Graduates who go on for advanced studies can attain more responsible positions with the possibility of rising to top professional levels. In addition to pursuing M.S. and Ph.D. degrees in chemical and biological engineering and related fields, some of our graduates have obtained M.D., D.V.M., law, and M.B.A. degrees.

Course	Title	Cr	AUCC
FRESHMAN			
CBE 101	Chemical and Biological Engineering I	3	
CBE 102 ^P	Chemical and Biological Engineering II	3	
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CHEM 113 ^P	General Chemistry II	3	
CHEM 114 ^P	General Chemistry Laboratory II	1	
LIFE 102 ^P	Attributes of Living Systems	4	3A
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	TOTAL	32	
SOPHOMORE			
CBE 201 ^P	Material and Energy Balances	3	
CBE 210 ^P	Thermodynamic Process Analysis	3	
CHEM 345 ^P	Organic Chemistry I	4	
CHEM 346 ^P	Organic Chemistry II	4	
CO 150 ^P	College Composition	3	1A
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Arts/humanities ¹	3	3B
	TOTAL	33	
JUNIOR			
BC 351 ^P	Principles of Biochemistry	4	
CBE 310	Molecular Concepts and Applications	3	
CBE 320 ^P	Chemical and Biological Reactor Design	3	
CBE 330 ^P	Process Simulation	3	
CBE 331 ^P	Momentum Transfer and Mechanical Separations	3	4B
CBE 332 ^P	Heat Transfer and Mass Transfer Fundamentals	3	
CBE 333 ^P	Momentum and Heat Transfer Laboratory	2	
	Additional communication ²	3	2A or 2B
	Global and cultural awareness ³	3	3E
	Bioscience elective ⁴	3	
	Technical elective ⁴	3	
	TOTAL	33	
SENIOR			
CBE 430 ^P	Process Control and Instrumentation	3	
CBE 442 ^P	Separation Processes	4	
CBE 443 ^P	Mass Transfer and Separation Laboratory	2	
CBE 451 ^P	Chemical Engineering Design I	3	4C

Course	Title	Cr	AUCC
CBE 452 ^P	Chemical Engineering Design II	3	4A, 4C
CBE 493	Seminar	1	
	Arts/humanities ¹	3	3B
	Historical perspectives ⁵	3	3D
	Social/behavioral sciences ⁶	3	3C
	Engineering elective ⁴	3	
	Technical electives ⁴	4	
	TOTAL	32	

PROGRAM TOTAL = 130 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3B in the All-University Core Curriculum (AUCC). Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

² Select from the list of courses in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

³ Select from the list of courses in category 3E in the AUCC.

⁴ Select from departmental list of approved courses.

⁵ Select from the list of courses in category 3D in the AUCC.

⁶ Select from the list of courses in category 3C in the AUCC.

Graduate Programs in Chemical and Biological Engineering

The department offers graduate programs leading to Master of Engineering, Master of Science, and Doctor of Philosophy degrees. Students interested in graduate work should refer to the *Graduate and Professional Bulletin*, <http://graduate.school.colostate.edu/index.asp?url=catalog>, for general information on graduate studies. The department publishes a descriptive brochure, which may be obtained from our web site or by writing to the department head.

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Office in Engineering Building, Room 203
(970) 491-5048
<http://www.engr.colostate.edu/ce>

Professor Luis Garcia, Department Head
Professor Marvin E. Criswell, Associate Department Head
Professor Darrell G. Fontane, Associate Department Head
Laurie Alburn, Graduate and Undergraduate Adviser

The Department of Civil and Environmental Engineering administers undergraduate and graduate degrees in civil engineering and an undergraduate degree in environmental engineering

Major in Civil Engineering

The undergraduate civil engineering program provides a solid base in the physical sciences, mathematics, engineering

fundamentals, and design and management concepts, as well as the social sciences and humanities. In addition to courses in civil engineering subdisciplines, the civil engineering curriculum covers design practices, information technology, technical communications, project management, and engineering ethics. Preparation for high level professional practice is emphasized. Graduates from this major and the environmental engineering major consistently have a passing rate significantly above the national average on the Fundamentals of Engineering exam, the first step towards registration as a Professional Engineer.

The series of civil engineering core classes – CIVE 102, CIVE 103, CIVE 202, CIVE 203, CIVE 302, CIVE 303, CIVE 402, and CIVE 403 – include an integrated coverage of design practices, information technology, technical communications, project management, and engineering ethics preparing students for the civil engineering profession. This series culminates in a year-long term-based senior capstone design experience.

Participation in internships, volunteer activities, professional organizations, or cooperative education opportunities is highly recommended to enhance practical training and development. Graduates who go on for advanced studies are prepared for higher level technical responsibilities and can attain more responsible positions with the possibility of rising to top professional levels.

The educational outcomes and objectives for the civil engineering major, along with additional information on this major, are given at www.engr.colostate.edu/ce/.

Potential Occupations

Civil engineers are employed in many different organizations including small and large consulting firms, governmental agencies at all levels, and industrial companies such as construction, petroleum, and aerospace firms. Civil engineers may also find opportunities in specialized design, research, and teaching.

Some example job titles for civil engineering graduates include, but are not limited to: civil engineer, environmental engineer, transportation engineer, hydraulic engineer, water resources engineer, structural engineer, fluid mechanics, geotechnical engineer, geoenvironmental engineer, groundwater engineer, hydrologist, wind engineer, urban/regional planner, infrastructure engineer or manager, architect, contract administrator, construction engineer or manager, building construction inspector, facilities engineer or manager, industrial transportation specialist, industrial designer/engineer, construction materials engineer, irrigation engineer, mining engineer, cartographer, mining and

petroleum research engineer, technical sales engineer, and educator.

Civil Engineering Concentration

Course	Title	Cr	AUCC
FRESHMAN			
CIVE 102	Introduction: Civil/Environmental Engineering	3	
CIVE 103 ^P	Engineering Graphics and Computing	3	
CO 150 ^P	College Composition	3	1A
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Arts/humanities ¹	3	3B
	Social/behavioral sciences ²	3	3C
	TOTAL	33	
SOPHOMORE			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CHEM 113 ^P	General Chemistry II	3	
CIVE 202 ^P	Numerical Modeling and Risk Analysis	3	
CIVE 203 ^P	Engineering Systems and Decision Analysis	3	
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
CIVE 360 ^P	Mechanics of Solids	3	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MECH 237 ^P	Introduction to Thermal Sciences	3	
	Arts/humanities ¹	3	3B
	TOTAL	33	
JUNIOR			
CIVE 300 ^P	Fluid Mechanics	4	
CIVE 302 ^P	Evaluation of Civil Engineering Materials	3	
CIVE 303 ^P	Infrastructure and Transportation Systems	3	
CIVE 322 ^{P/}	Basic Hydrology	3	
ENVE 322 ^P			
CIVE 367 ^P	Structural Analysis	3	
CIVE 450 ^P	Introduction to Geotechnical Engineering	4	
CIVE 466 ^P	Design and Behavior of Steel Structures	3	
ECE 204 ^P	Introduction to Electrical Engineering	3	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
	Additional communications ³	3	2A or 2B
	TOTAL	33	
SENIOR			
CIVE 401 ^P	Hydraulic Engineering	3	
CIVE 402 ^P	Senior Design Principles	3	
CIVE 403 ^P	Senior Project Design	3	4C
CIVE 438 ^{P/}	Pollution Control Engineering	4	
ENVE 438 ^P			
CIVE 467 ^P	Design of Reinforced Concrete Structures	3	
	Global and cultural awareness ⁴	3	3E
	Historical perspectives ⁵	3	3D
	Technical electives ⁶	9	
	TOTAL	31	
PROGRAM TOTAL = 130 credits			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select two courses from department list of those in category 3B in the All-University Core Curriculum (AUCC). Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

² Select from departmental list of courses from those in category 3C in the AUCC.

³ Select from departmental list of courses from those in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

⁴ Select from departmental list of courses from those in category 3E in the AUCC.

⁵ Select from departmental list of courses from those in category 3D in the AUCC.

⁶ Select from departmental list of permissible technical elective courses.

Soil and Water Resource Engineering Concentration

Course	Title	Cr	AUCC
FRESHMAN			
CIVE 102	Introduction: Civil/Environmental Engineering	3	
CIVE 103 ^P	Civil Engineering Graphics and Computing	3	
CO 150 ^P	College Composition	3	1A
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Arts/humanities ¹	3	3B
	Social/behavioral sciences ²	3	3C
	TOTAL	33	
SOPHOMORE			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory II	1	3A
CHEM 113 ^P	General Chemistry II	3	
CIVE 202 ^P	Numerical Modeling and Risk Analysis	3	
CIVE 203 ^P	Engineering Systems and Decision Analysis	3	
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
CIVE 360 ^P	Mechanics of Solids	3	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MECH 237 ^P	Introduction to Thermal Sciences	3	
	Arts and humanities ¹	3	3B
	TOTAL	33	
JUNIOR			
CIVE 300 ^P	Fluid Mechanics	4	
CIVE 302 ^P	Evaluation of Civil Engineering Materials	3	
CIVE 303 ^P	Infrastructure and Transportation Systems	3	
CIVE 322 ^{P/}	Basic Hydrology	3	
ENVE 322 ^P			
CIVE 367 ^P	Structural Analysis	3	
CIVE 450 ^P	Introduction to Geotechnical Engineering	4	
ECE 204 ^P	Introduction to Electrical Engineering	3	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
SOCR 240 ^P	Introductory Soil Science	4	
	TOTAL	31	
SENIOR			
CIVE 401 ^P	Hydraulic Engineering	3	
CIVE 402 ^P	Senior Design Principles	3	
CIVE 403 ^P	Senior Project Design	3	4C
CIVE 425 ^P	Soil and Water Engineering	3	
CIVE 440 ^P	Nonpoint Source Pollution	3	
SOCR 420 ^P	Crop and Soil Management Systems I	3	
	Additional communications ³	3	2A or 2B
	Global and cultural awareness ⁴	3	3E
	Historical perspectives ⁵	3	3D
	Technical electives ⁶	6	
	TOTAL	33	
PROGRAM TOTAL = 130 credits			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select two courses from departmental list of those in category 3B in the All-University Core Curriculum (AUCC). Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

² Select from departmental list of courses from those in category 3C in the AUCC.

³ Select from departmental list of courses from those in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

⁴ Select from departmental list of courses from those in category 3E in the AUCC.

⁵ Select from departmental list of courses from those in category 3D in the AUCC.

⁶ Select from departmental list of permissible technical elective courses.

Major in Environmental Engineering

Environmental engineers design solutions to prevent future pollution as well as correct existing pollution problems. The B.S. curriculum in environmental engineering is based on a strong foundation in physical and biological sciences, mathematics, and engineering fundamentals. A broad background in communication, liberal arts, humanities, and social sciences is provided by the All-University Core Curriculum. Upper-level courses address engineering applications for prevention and control of air, water, and land pollution. Required courses that are specific to the environmental engineering major come from several engineering and science disciplines and include organic and environmental chemistry, microbiology, hydrology, statistics, environmental toxicology, and water treatment. Technical electives permit some specialization in a particular field of interest. Seniors complete the same year-long design experience as do civil engineering majors, working in teams on real-world engineering problems.

Participation in student professional societies, other campus organizations, internships, and volunteer activities is highly recommended to foster personal growth and professional development. The Fundamentals of Engineering exam is strongly encouraged and is the first step toward registration as a Professional Engineer, an important credential for environmental engineers.

The education outcomes and objectives for the environmental engineering major, along with additional information on this major, are given at www.engr.colostate.edu/ce.

Potential Occupations

The expansion of our population and economy, along with increased public concern and regulation of environmental quality, will contribute to increasing demand for the services of environmental engineers, both in the U.S. and abroad. Today environmental engineers are at work designing pollution prevention equipment and systems, designing environmental monitoring systems, helping both government and industry implement environmental regulations, designing water and wastewater treatment systems, and restoring ecosystem health.

B.S. graduates in environmental engineering from Colorado State University are well prepared for entry-level positions with regulatory agencies, engineering consulting firms, and environmental divisions of large corporations, particularly in the energy and manufacturing industries. Graduate study in a particular area of interest is highly recommended to enhance the probability of rising to top professional levels.

Course	Title	Cr	AUCC
FRESHMAN			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CHEM 113 ^P	General Chemistry II	3	
CHEM 114 ^P	General Chemistry Laboratory II	1	
CIVE 102	Introduction: Civil/Environmental Engineering	3	
CIVE 103	Engineering Graphics and Computing	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	TOTAL	33	
SOPHOMORE			
AREC 202	Agricultural and Resource Economics	3	3C
OR			
ECON 202 ^P	Principles of Microeconomics	3	3C
<i>Select four credits from the following:</i>			
BZ 110	Principles of Animal Biology	3	3A
AND			
BZ 111 ^P	Animal Biology Laboratory	1	3A
BZ 120	Principles of Plant Biology	4	3A
LIFE 102 ^P	Attributes of Living Systems	4	3A
CHEM 245 ^P	Fundamentals of Organic Chemistry	4	
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
CO 150 ^P	College Composition	3	1A
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	4A, 4B
	Additional communication ¹	3	2A or 2B
	TOTAL	31	
JUNIOR			
CBE 201 ^P	Material and Energy Balances	3	
OR			
MECH 237 ^P	Introduction to Thermal Sciences	3	
CIVE 202 ^P	Numerical Modeling and Risk Analysis	3	
CIVE 203 ^P	Engineering Systems and Decision Analysis	3	
CIVE 300 ^P	Fluid Mechanics	4	
CIVE 322 ^{P/}	Basic Hydrology	3	
ENVE 322 ^P			
CIVE 360 ^P	Mechanics of Solids	3	
CIVE 438 ^{P/}	Pollution Control Engineering	4	
ENVE 438 ^P			
ERHS 446 ^P	Environmental Toxicology	3	
MIP 300 ^P	General Microbiology	3	
MIP 301 ^P	Fundamental Microbiology Laboratory Techniques	1	
	Arts/humanities ²	3	3B
	TOTAL	33	
SENIOR			
CIVE 401 ^P	Hydraulic Engineering	3	
CIVE 402 ^P	Senior Design Principles	3	
CIVE 403 ^P	Senior Project Design	3	4C
CIVE 425 ^P	Soil and Water Engineering ³	3	
CIVE 439 ^{P/}	Environmental Engineering Chemical Concepts	3	
CBE 439 ^P			
ENVE 441 ^P	Water and Wastewater Characterization	1	
	Arts/humanities ²	3	3B
	Global and cultural awareness ⁴	3	3E
	Historical perspectives ⁵	3	3D
	Technical electives ⁶	8	
	TOTAL	33	
PROGRAM TOTAL = 130 credits			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 2A or 2B in the All-University Core Curriculum (AUCC). First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

² Select from the list of courses in category 3B in the AUCC. Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

³ ATS 555 and ATS 560 (both courses) may substitute for CIVE 425. If this pair of courses is chosen, one credit may be counted toward technical electives.

⁴ Select from the list of courses in category 3E in the AUCC.

⁵ Select from the list of courses in category 3D in the AUCC.

⁶ Select courses with adviser's approval.

Minor in Environmental Engineering

In order to permit undergraduate students in any engineering major to take advantage of Colorado State's environmental expertise, the Department of Civil and Environmental Engineering offers a minor in environmental engineering. The minor is designed to broaden the academic background of undergraduate engineering students seeking a career in environmental fields, and to provide fundamentals required to pursue a master's degree in environmental engineering or related fields.

Course	Title	Cr	AUCC
LOWER DIVISION			
CHEM 245 ^{P*}	Fundamentals of Organic Chemistry ^{1,2}	4	
CHEM 246 ^{P*}	Fundamentals of Organic Chemistry Laboratory ^{1,2}	1	
	TOTAL	5	
UPPER DIVISION			
<i>Select four to five credits from the following:⁴</i>			
BC 351 ^{P*}	Principles of Biochemistry	4	
CBE 439 ^{P/}	Environmental Engineering Chemical Concepts	3	
CIVE 439 ^{P*}	Concepts		
CBE 443 ^{P*}	Mass Transfer and Separation Laboratory	2	
CIVE 440 ^{P*}	Nonpoint Source Pollution	3	
ERHS 446 ^P	Environmental Toxicology	3	
MECH 463 ^{P*}	Building Energy Systems	3	
MIP 432 ^P	Microbial Ecology	3	
PHIL 345 ^P	Environmental Ethics	3	
CHEM 471 ^{P*}	Physical Chemistry for Biological Sciences	4	
CIVE 438 ^{P/}	Pollution Control Engineering ^{3,4}	4	
ENVE 438 ^{P*}			
OR			
MECH 448 ^{P/}	Pollution Prevention ⁴	3	
ENVE 448 ^{P*}			
MIP 300 ^{P*}	General Microbiology	3	
MIP 301 ^P	Fundamental Microbiology Laboratory Techniques	1	
	TOTAL	16	
PROGRAM TOTAL = 21 credits without prerequisites			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

*Additional course work may be required because of prerequisites.

¹ Minor based on freshman chemistry sequence of CHEM 111, CHEM 112, CHEM 113, CHEM 114.

² CHEM 345 may be substituted for CHEM 245, CHEM 246, but additional elective credit may be needed to bring program total to 21.

³ Civil Engineering majors cannot take CIVE 438/ENVE 438 for credit in the minor, and therefore must take nine credits from the elective list.

⁴ If CIVE 438/ENVE 438 is selected, select four credits from the previous list; if MECH 448/ENVE 448 is selected, select five credits. Students cannot select courses offered by their department that are required by their major.

Graduate Programs in Civil and Environmental Engineering

In civil engineering, programs leading to the Master of Science and Doctor of Philosophy degrees are offered in

environmental engineering, fluid mechanics and wind engineering, geotechnical engineering, groundwater/environmental hydrogeology, hydraulics, structural engineering and solid mechanics, and water resources planning and management.

A practice-oriented, course-work only, Master of Engineering program is available to students with a baccalaureate degree in engineering. Graduates of some science programs are also eligible, but are typically required to also complete some background courses at the undergraduate level. Master of Engineering tracks are offered in environmental engineering, geotechnical engineering, infrastructure engineering, structural engineering, and water resources engineering.

Students interested in graduate work should refer to the *Graduate and Professional Bulletin*, <http://graduateschool.colostate.edu/index.asp?url=catalog>. The civil engineering departmental Graduate Studies web page and research in civil engineering may be found at www.engr.colostate.edu/ce/grad/index.shtml.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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*Professor Anthony Maciejewski, Department Head
Elisabeth Wadman, Academic Adviser*

Major in Electrical or Computer Engineering

Have you ever wondered how cell phones, iPods, high definition TV, virtual reality systems, the Internet, and high performance computers came about? These, and many other high tech developments, largely come from the efforts and ingenuity of electrical and computer engineers.

The Department of Electrical and Computer Engineering at Colorado State University can connect you with world-class teaching, research, and proven people in an unbeatable setting. Here you can study alongside professors who share their rich experience and expertise to expand your knowledge and teach you to think creatively for our high tech world.

Striving to create for students an atmosphere that is friendly, open, and conducive to teaching and learning, our faculty will work closely with you to prepare you for success. ECE courses and research span five major disciplines:

- Communications and signal processing
- Computer engineering
- Controls and robotics
- Lasers, optics, and applications
- Electromagnetics and remote sensing.

The ECE undergraduate and graduate curricula are designed to provide a wide coverage of mathematics and science, considerable depth in electrical and computer engineering, exposure to other engineering disciplines, and a general knowledge of the humanities and social sciences. We offer two undergraduate degree programs: a bachelor of science in electrical engineering (with a concentration in electrical engineering or lasers and optical engineering) and a bachelor of science in computer engineering. You can also incorporate a certificate in biomedical engineering into either degree program.

During the senior year, all ECE students are required to participate in a capstone design project. Combining classroom learning with engineering practice, you will work on a real-world project, overseeing all phases from design and manufacture to documentation and marketing.

Potential Occupations

Electrical and computer engineers design, develop, and supervise the manufacture of electrical, electronic, and computer systems or components. Engineers also test new equipment/systems, write performance requirements, develop maintenance schedules, and solve operating problems. The fields of electrical and computer engineering encompass a broad range of knowledge, therefore virtually all industries employ electrical and computer engineers at some level.

According to the 2007 Job Outlook Report from the National Association of Colleges and Employers, electrical engineering and computer engineering are among the top ten majors in demand for bachelor's, master's, and doctoral degrees. The number of U.S.-based high-tech workers is higher today than it was at the peak of the Internet boom, and ECE graduates consistently earn higher starting salaries than most other disciplines.

Major in Computer Engineering

Computer engineering emphasizes computer electronics, digital system design, digital computing and networking, and computer programming.

Computer engineering students are required to take five computer science courses and choose senior elective courses in computer-related areas.

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in electrical engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with his or her adviser to correct grade point deficiencies. In addition, it is required that students retake any electrical engineering course at the 300 level or below in which they receive a grade below C-.

Course	Title	Cr	AUCC
FRESHMAN			
CO 150 ^P	College Composition	3	1A
CS 160 ^P	Foundations in Programming	4	
ECE 102	Digital Circuit Logic	4	
ECE 103 ^P	DC Circuit Analysis	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Historical perspectives ¹	3	3D
	TOTAL	30	
SOPHOMORE			
CS 161 ^P	Object-Oriented Problem Solving	4	
CS 200 ^P	Algorithms and Data Structures	4	
ECE 202 ^P	Circuit Theory Applications	4	
ECE 251 ^P	Introduction to Microprocessors	4	
MATH 261 ^P	Calculus for Physical Scientists III	4	
----- <i>Select 4-6 credits from the following:</i>			
MATH 229 ^P	Matrices and Linear Equations	2	
AND			
MATH 345 ^P	Differential Equations	4	
OR			
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Arts/humanities ²	3	3B
	TOTAL	32-34	
JUNIOR			
CS 253 ^P	Problem Solving with C++	4	
CS 301 ^P	Foundations of Computer Science ³	4	
OR			
ECE 332 ^P	Electronics Principles II ⁴	4	
CS 370 ^P	System Architecture and Software	4	
ECE 311 ^P	Linear System Analysis I	3	
ECE 312 ^P	Linear System Analysis II	3	
ECE 331 ^P	Electronics Principles I	4	
ECE 450 ^P	Digital System Design Laboratory	1	
ECE 451 ^P	Digital System Design	3	
ECE 452 ^P	Computer Organization and Architecture	3	
ECON 202 ^P	Principles of Microeconomics	3	3C
	TOTAL	32	
SENIOR			
CO 301B ^P	Writing in the Disciplines-Science	3	2B
OR			
JTC 300 ^P	Professional and Technical Communication	3	2B
ECE 303 ^{P/}	Introduction to Communications	3	
STAT 303 ^P	Principles	3	
ECE 401 ^P	Senior Design Project I	3	4A, 4B
ECE 402 ^P	Senior Design Project II	3	4C
ECE 456 ^P	Computer Networks	4	
	Arts/humanities ²	3	3B
	Global and cultural awareness ⁵	3	3E
	Technical electives ⁶	11	
	TOTAL	33	

PROGRAM TOTAL = 127-129 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3D in the All-University Core Curriculum (AUCC).

² Select from list of courses in category 3B of the AUCC. Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

³ CS 301 (followed by CS 453 in the senior year) is recommended for students interested in specializing in computer system design.

⁴ ECE 332 is recommended for students interested in specializing in VLSI.

⁵ Select from the list of courses in category 3E in the AUCC.

⁶ Select from departmental list. CS 453 is recommended as one of the electives for students interested in specializing in computer system design.

Major in Electrical Engineering

Students choose between the electrical engineering and lasers and optical engineering concentrations, each one of which leads to the Bachelor of Science degree. The number of credits within each concentration ranges between 125 and 127 credits. Since the first year of both programs is common, the student need not make his or her choice until the sophomore year. In the senior year, electrical engineering students select courses relating to their particular career interests. These courses may be in the following fields: analog and digital electronics, digital systems and signal processing, microelectronics, computers, robotics and controls, lasers, power generation and distribution, optical electronics, semiconductors, antennas, and radar.

Electrical Engineering Concentration

Electrical engineering focuses on traditional subjects such as circuits, electronics, electromagnetic fields, and electromechanical devices.

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in electrical engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with his or her adviser to correct grade point deficiencies. In addition, it is required that students retake any electrical engineering course at the 300 level or below in which they receive a grade below a C-.

Course	Title	Cr	AUCC
FRESHMAN			
CO 150 ^P	College Composition	3	1A
----- <i>Select 3-4 credits from the following:</i>			
CS 155	Introduction to Unix	1	
CS 156 ^P	Introduction to C Programming I	1	
CS 157 ^P	Introduction to C Programming II	1	
CS 160 ^P	Foundations in Programming	4	
ECE 102	Digital Circuit Logic	4	
ECE 103 ^P	DC Circuit Analysis	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Historical perspectives ¹	3	3D
	TOTAL	29-30	
SOPHOMORE			
CHEM 111 ^P	General Chemistry I	4	3A
ECE 202 ^P	Circuit Theory Applications	4	
ECE 251 ^P	Introduction to Microprocessors	4	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	
OR			
MATH 345 ^P	Differential Equations	4	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Science/engineering elective ²	6	

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Course	Title	Cr	AUCC
TOTAL		31	
JUNIOR			
CO 301B ^P	Writing in the Disciplines-Science	3	2B
OR			
JTC 300 ^P	Professional and Technical Communication	3	2B
ECE 303 ^P /	Introduction to Communication	3	
STAT 303 ^P	Principles		
ECE 311 ^P	Linear System Analysis I	3	
ECE 312 ^P	Linear System Analysis II	3	
ECE 331 ^P	Electronic Principles I	4	
ECE 332 ^P	Electronics Principles II	4	4A
ECE 341 ^P	Electromagnetic Fields and Devices I	3	
ECE 342 ^P	Electromagnetic Fields and Devices II	3	
	Global and cultural awareness ³	3	3E
	Science/engineering elective ²	3	
TOTAL		32	
SENIOR			
ECE 401 ^P	Senior Design Project I	3	4A, 4B
ECE 402 ^P	Senior Design Project II	3	4C
ECE 471 ^P	Semiconductor Devices	3	
ECON 202 ^P	Principles of Microeconomics	3	3C
	Arts/humanities ⁴	6	3B
	Technical electives ⁵	15	
TOTAL		33	

PROGRAM TOTAL = 125-126 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3D in the All-University Core Curriculum (AUCC).

² One or more courses to be chosen from CHEM 112, CIVE 260, CIVE 262, CS 200, MATH 229, MATH 366, MATH 419, MATH 470, MECH 237, PH 314, PH 341, or PH 353. If selected course(s) is/are less than six credits, the credit deficiency must be replaced by additional senior elective credits.

³ Select two courses from the list of courses in category 3E in the AUCC.

⁴ Select from the list of courses in category 3B in the AUCC Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

⁵ Select from departmental list of approved courses.

Lasers and Optical Engineering Concentration

Lasers and optical engineering focuses on optics and waves, optical electronics, optical information processing, and communications.

Lasers and optical engineering students take an additional physics course, senior-level courses in optical electronics and optical processing, and technical electives in the optical area.

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in electrical engineering courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with his or her adviser to correct grade point deficiencies. In addition, it is required that students retake any electrical engineering course at the 300 level or below in which they receive a grade below a C-.

Course	Title	Cr	AUCC
FRESHMAN			
CO 150 ^P	College Composition	3	1A
<i>Select 3-4 credits from the following:</i>			
CS 155	Introduction to Unix	1	
CS 156 ^P	Introduction to C Programming I	1	
CS 157 ^P	Introduction to C Programming II	1	

Course	Title	Cr	AUCC
CS 160 ^P	Foundations in Programming	4	
ECE 102	Digital Circuit Logic	4	
ECE 103 ^P	DC Circuit Analysis	3	
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Historical perspectives ¹	3	3D
TOTAL		29-30	
SOPHOMORE			
CHEM 111 ^P	General Chemistry I	4	3A
ECE 202 ^P	Circuit Theory Applications	4	
ECON 202 ^P	Principles of Microeconomics	3	3C
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	
OR			
MATH 345 ^P	Differential Equations	4	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
PH 314 ^P	Introduction to Modern Physics	4	
	Arts/humanities ²	3	3B
TOTAL		31	
JUNIOR			
CO 301B ^P	Writing in the Disciplines-Science	3	2B
OR			
JTC 300 ^P	Professional and Technical Communication	3	2B
ECE 311 ^P	Linear System Analysis I	3	
ECE 331 ^P	Electronics Principles I	4	
ECE 332 ^P	Electronics Principles II	4	4A
ECE 341 ^P	Electromagnetic Fields and Devices I	3	
ECE 342 ^P	Electromagnetic Fields and Devices II	3	
PH 353 ^P	Optics and Waves	4	
	Arts/humanities ²	3	3B
	Global and cultural awareness ³	3	3E
	Science/engineering elective ⁴	3	
TOTAL		33	
SENIOR			
ECE 303 ^P /	Introduction to Communications	3	
STAT 303 ^P	Principles		
ECE 401 ^P	Senior Design Project I ⁵	3	4A, 4B
ECE 402 ^P	Senior Design Project II	3	4C
ECE 404 ^P	Experiments in Optical Electronics	2	
ECE 441 ^P	Optical Electronics	3	
ECE 457 ^P	Fourier Optics	3	
ECE 471 ^P	Semiconductor Devices	3	
PH 451 ^P	Introductory Quantum Mechanics I	3	
	Technical electives ⁶	9	
TOTAL		32	

PROGRAM TOTAL = 125-126 credits

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3D in the All-University Core Curriculum (AUCC).

² Select from the list of courses in category 3B in the AUCC. Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

³ Select from the list of courses in category 3E in the AUCC.

⁴ One or more courses to be chosen from CHEM 112, CIVE 260, CIVE 262, CS 200, MATH 229, MATH 366, MATH 419, MATH 470, MECH 237, PH 341, or PH 353. If selected course(s) is/are less than three credits, the credit deficiency must be replaced by additional senior technical elective credits.

⁵ Project must be a laser and optical engineering topic.

⁶ Select from departmental list of approved courses in the laser and optical engineering area.

Graduate Programs in Electrical and Computer Engineering

Graduate programs leading to the Master of Science, Master of Engineering (electrical and computer engineering specialization), and Doctor of Philosophy degrees are

offered in several areas. Students interested in graduate work should refer to the *Graduate and Professional Bulletin* <http://graduateschool.colostate.edu/index.asp?url=catalog> and the department's website, <http://www.engr.colostate.edu/ece/>.

DEPARTMENT OF MECHANICAL ENGINEERING

Office in Engineering Building, Room A101
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Professor Allan T. Kirkpatrick, Head
Chriselda Engel, Undergraduate Adviser
Sharie Harless, Graduate Adviser

Major in Mechanical Engineering

Would you enjoy the challenge of finding alternative energy sources, doing computer-aided design, or biomedical research? Does creating new designs for the auto industry, or in the fields of aeronautics and aerospace sound interesting? Would designing, analyzing, and doing research and development in a wide range of industrial and governmental enterprises be of interest to you? Does studying thermal sciences and the integration of electronic and mechanical devices interest you? Do you like putting ideas and designs to work? If your answer to any of these questions is "yes," then a major in mechanical engineering may be for you.

Mechanical engineers design, develop, and manufacture the machines and instrumentation that run energy, manufacturing, and transport systems. Examples include production machinery, ground/air/space vehicles, robots, environmental control equipment, and power plants. They are also involved in design and manufacture of biomedical devices and equipment. Mechanical engineers are involved in nearly all aspects of energy conversion, environmental control, heat and mass transfer, propulsion, system dynamics and design, manufacturing systems, and computing engineering.

Students take basic science and mathematics courses while beginning their engineering studies in design and computing. A broad spectrum of classes is designed to sharpen problem-solving skills. The senior year focuses on a year-long design course to help students in the transition from college to career. Students also choose technical electives from the energy, industrial engineering, materials, mechanics and controls, and thermal sciences areas. Participation in labs further develops design, modeling, and analysis skills. Students participate in an intercollegiate engineering competition, applying their knowledge to the solution of real world problems.

Educational outcomes and objectives of the mechanical engineering major, along with additional information on this major are given at <http://www.engr.colostate.edu/me/>.

Potential Occupations

Industrial organizations hire mechanical engineers to work in design, manufacturing, field engineering, research, development, and management. Mechanical engineers also work in the technological development of medical implants and health care technologies, new engines, emission reduction, creating lightweight composite materials, and design. Mechanical engineers in the building industry seek to reduce the energy consumption of new and existing buildings with the use of advanced control systems, energy efficient design, and solar and other renewable energies.

Graduates from the Department of Mechanical Engineering are expected to have the fundamental knowledge required for the successful practice of mechanical engineering. Colorado State University engineering graduates are generally well prepared for a professional career with a greater than 90% pass rate on the Fundamentals of Engineering professional examination. Participating in internships, volunteer activities, or cooperative education opportunities is highly recommended to enhance practical training and development. Students who go on for graduate studies can attain more responsible positions with the possibility of rising to top professional levels.

All undergraduate mechanical engineering majors must obtain a minimum grade of C- (a grade of C- is not acceptable) in each engineering, technical elective, physics, chemistry, and mathematics course used to satisfy graduation requirements.

Course	Title	Cr	AUCC
FRESHMAN			
CHEM 111 ^P	General Chemistry I	4	3A
CHEM 112 ^P	General Chemistry Laboratory I	1	3A
CO 150 ^P	College Composition	3	1A
MATH 160 ^P	Calculus for Physical Scientists I	4	1B
MATH 161 ^P	Calculus for Physical Scientists II	4	1B
MECH 100 ^P	Introduction to Mechanical Engineering	1	
MECH 102 ^P	Mechanical Engineering Problem Solving	3	
MECH 200 ^P	Introduction to Manufacturing Processes	3	
PH 141 ^P	Physics for Scientists and Engineers I	5	3A
	Arts/humanities ¹	3	3B
	TOTAL	31	
SOPHOMORE			
CIVE 260 ^P	Engineering Mechanics-Statics	3	
CIVE 261 ^P	Engineering Mechanics-Dynamics	3	
ECE 204 ^P	Introduction to Electrical Engineering	3	
MATH 261 ^P	Calculus for Physical Scientists III	4	
MATH 340 ^P	Introduction to Ordinary Differential Equations	4	
MECH 201 ^P	Engineering Design I	3	
MECH 202 ^P	Engineering Design II	3	
MECH 337 ^P	Thermodynamics	4	
PH 142 ^P	Physics for Scientists and Engineers II	5	3A
	Additional communication ²	3	2A or 2B
	TOTAL	35	
JUNIOR			
CIVE 360 ^P	Mechanics of Solids	3	

College of Engineering

Course	Title	Cr	AUCC
CIVE 363 ^P	Material Properties	1	
MECH 302 ^P	Engineering Design III	3	4A
MECH 307 ^P	Mechatronics and Measurement Systems	4	
MECH 324 ^P	Dynamics of Machines	4	
MECH 325 ^P	Machine Design	3	
MECH 331 ^P	Introduction to Engineering Materials	4	
MECH 338 ^P	Thermosciences Laboratory	1	
MECH 342 ^P	Mechanics and Thermodynamics of Flow Processes	3	
MECH 344 ^P	Heat and Mass Transfer	3	4B
	Science technical elective	3	
	TOTAL	32	
SENIOR			
MECH 486A ^P	Engineering Design Practicum I	4	4C
MECH 486B ^P	Engineering Design Practicum II	4	4C
	Arts/humanities ¹	3	3B
	Global and cultural awareness ³	3	3E
	Historical perspectives ⁴	3	3D
	Social/behavioral sciences ⁵	3	3C
	Technical electives ⁶	12	
	TOTAL	32	
PROGRAM TOTAL = 130 credits			

^P This course has at least one prerequisite. Check the Courses of Instruction section of the catalog or <http://catalog.colostate.edu/front/courses-of-instruction.aspx> to see the course prerequisites.

¹ Select from the list of courses in category 3B in the All-University Core Curriculum (AUCC). Only 3 of the 6 credits required for arts and humanities may come from intermediate (L* 200 and L* 201) foreign language courses.

² Select from the list of courses in category 2A or 2B in the AUCC. First-time students entering a college or university on or after July 1, 2008, must take an advanced writing course (category 2B).

³ Select from the list of courses in category 3E in the AUCC.

⁴ Select from the list of courses in category 3D in the AUCC.

⁵ Select from the list of courses in category 3C in the AUCC.

⁶ Select from department list of approved courses.

Graduate Programs in Mechanical Engineering

Programs are offered leading to the Master of Science, Master of Engineering (mechanical engineering specialization), and Doctor of Philosophy. Students interested in graduate work should refer to the *Graduate and Professional Bulletin*, <http://graduateschool.colostate.edu/index.asp?url=catalog> and the department's website, www.engr.colostate.edu/me/.

Colorado State University reserves the right at any time, without notice, to change, modify, or cancel any course, program, procedure, policy, financial requirement, or disciplinary arrangement set forth in this catalog whenever, in its sole discretion, it determines such action to be appropriate. Furthermore, Colorado State will not be responsible for any failure to present or complete any course or program or to perform any other activity, function, or obligation mentioned in this catalog. Since changes may occur at any time, students must check the relevant website (as noted throughout various chapters in this catalog).