Civil Engineering

Bachelor of Science (BS)

The Department of Civil and Environmental Engineering's (CEE) undergraduate program offers opportunities for rigorous academic learning, fellowship, hands-on experience, and leadership. Classes are relatively small, so students get to know both the faculty and fellow students.

The program in civil and environmental engineering, which is top-ranked nationally, provides students with a strong fundamental background in engineering science, design, and practice. Students learn to solve societal problems—in California, the United States, and the world—such as:

- Improving civil infrastructure
- Protecting resources
- Mitigating hazards
- Creating efficient and sustainable civil systems

CEE's four-year curriculum leads to an ABET-accredited Bachelor of Science (BS) degree in Civil Engineering. Undergraduates at Berkeley have opportunities for professional interactions and community service. CEE has active student chapters of the American Society of Civil Engineers and the national honor society of Chi Epsilon as well as five nationally-ranked competition teams.

Areas of Emphasis

Students with a specific interest within civil engineering may choose to emphasize one of the following areas: engineering and project management; environmental engineering; geosystems; structural engineering, mechanics and materials; or transportation engineering. See suggestions (http://www.ce.berkeley.edu/undergrad/curriculum) for elective courses and the capstone design project.

Selection of an area of emphasis is optional. A BS in engineering is awarded whether or not a student follows the broad and general program or chooses an area of emphasis.

Accreditation

The BS program in Civil Engineering is accredited by the Engineering Accreditation Commission of the ABET, Inc. (http://www.abet.org/accreditation)

Admission to the Major

Prospective undergraduates to the College of Engineering will apply for admission to a specific program in the college. For further information, see the College of Engineering's website (http://coe.berkeley.edu/students/prospective-students/admissions.html).

Admission to Engineering via a Change of College application for current UC Berkeley students is highly unlikely and very competitive as there are few (if any) spaces that open in the college each year to students admitted to other colleges at UC Berkeley. For further information regarding a Change of College to Engineering, see the college's website (http://coe.berkeley.edu/students/current-undergraduates/change-of-college).

Minor Program

CEE does not offer a minor in Civil Engineering. Instead, the department offers the following specialized minors:
Environmental Engineering (http://guide.berkeley.edu/archive/2018-19/undergraduate/degree-programs/environmental-engineering)
GeoSystems (http://guide.berkeley.edu/archive/2018-19/undergraduate/degree-programs/geosystems)
Structural Engineering (http://guide.berkeley.edu/archive/2018-19/undergraduate/degree-programs/structural-engineering)

In addition to the University, campus, and college requirements, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All technical courses taken in satisfaction of major requirements must be taken for a letter grade.
2. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
3. A minimum overall grade point average (GPA) of 2.0 is required for all work undertaken at UC Berkeley.
4. A minimum GPA of 2.0 is required for all technical courses taken in satisfaction of major requirements.

For information regarding residence requirements and unit requirements, see the College Requirements tab.

For a detailed plan of study by year and semester, see the Plan of Study tab.

Lower Division Foundation Requirements

MATH 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4
CHEM 1A	General Chemistry	3
PHYSICS 7A	Physics for Scientists and Engineers	4
PHYSICS 7B	Physics for Scientists and Engineers	4
ENGIN 7	Introduction to Computer Programming for Scientists and Engineers	4
CIV ENG C30/ MEC ENG C85	Introduction to Solid Mechanics	3
COMPSCI C8	Foundations of Data Science	4
or INFO C8	Foundations of Data Science	
or STAT C8	Foundations of Data Science	
Basic Science Elective - Complete one of the following:		
CIV ENG 70	Engineering Geology	3-4
or CHEM 1B	General Chemistry	
or BIOLOGY 1B	General Biology Lecture and Laboratory	

Subject Matter Requirements

Students with a specific interest within civil engineering may choose to emphasize one of the following areas in their choice of electives: engineering and project management, environmental engineering, geosystems (geoengineering), structural engineering, or transportation

engineering. See suggested courses (http://www.ce.berkeley.edu/undergrad/curriculum) for each area of interest.

Fundamentals		
CIV ENG 100	Elementary Fluid Mechanics	4
or CIV ENG 130N	Mechanics of Structures	
CIV ENG 60	Structure and Properties of Civil Engineering Materials	3
CIV ENG 93	Engineering Data Analysis	3
Engineering Fundamentals Elective - Complete one of the following:		3-4
COMPSCI C10	Principles & Techniques of Data Science [4]	
EECS 127	Optimization Models in Engineering [4]	
ENGIN 40	Engineering Thermodynamics [4]	
MEC ENG 40	Thermodynamics [3]	
MEC ENG 104	Engineering Mechanics II [3]	
CEE Applications - Complete three of the following (9 units):		9
CIV ENG 103	Introduction to Hydrology [3]	
CIV ENG 111	Environmental Engineering [3]	
CIV ENG 120	Structural Engineering [3]	
CIV ENG 155	Transportation Systems Engineering [3]	
CIV ENG 175	Geotechnical and Geoenvironmental Engineering [3]	
CIV ENG 191	Civil and Environmental Engineering Systems Analysis [3]	
Professional Preparation		
CIV ENG 11	Engineered Systems and Sustainability	3
CIV ENG 167	Engineering Project Management	3
Capstone Design - Complete one of the following:		3-4
CIV ENG 105	Water and Wind - Design for a Variable Environment [3]	
CIV ENG 112	Environmental Engineering Design [3]	
CIV ENG 122N & CIV ENG 122	Design of Steel Structures and Structural Steel Design Project	
CIV ENG 123N & CIV ENG 123	Design of Reinforced Concrete Structures and Structural Concrete Design Project	
CIV ENG 153	Transportation Facility Design [3]	
CIV ENG 179	Geosystems Engineering Design [3]	
CIV ENG 180	Life-Cycle Design and Construction [4]	
CIV ENG 186	Design of Cyber-Physical Systems [3]	
CEE Extensions: Complete nine units of additional CIV ENG courses [1]		9

[1] CEE Extensions-Nine units chosen from upper division CIV ENG courses not being counted toward other major requirements. Students may use up to three units of CIV ENG graduate courses numbered 200-295, taken Fall 2017 or later, toward their CEE Extensions units. Students must have a technical GPA of 3.0 or higher to obtain permission to enroll in CE graduate courses. Students may receive up to three units of credit toward their CEE Extensions units for work on a research project in CE H194 (Honors Undergraduate Research).

Students in the College of Engineering must complete no fewer than 120 semester units with the following provisions:

1. Completion of the requirements of one engineering major program (http://engineering.berkeley.edu/academics/undergraduate-programs) study.
2. A minimum overall grade point average of 2.00 (C average) and a minimum 2.00 grade point average in upper division technical coursework required of the major.
3. The final 30 units and two semesters must be completed in residence in the College of Engineering on the Berkeley campus.
4. All technical courses (math, science and engineering) that can fulfill requirements for the student's major must be taken on a letter graded basis (unless they are only offered P/NP).
5. Entering freshmen are allowed a maximum of eight semesters to complete their degree requirements. Entering junior transfers are allowed a maximum of four semesters to complete their degree requirements. (Note: junior transfers admitted missing three or more courses from the lower division curriculum are allowed five semesters.) Summer terms are optional and do not count toward the maximum. Students are responsible for planning and satisfactorily completing all graduation requirements within the maximum allowable semesters.
6. Adhere to all college policies and procedures (http://engineering.berkeley.edu/academics/undergraduate-guide) as they complete degree requirements.
7. Complete the lower division program before enrolling in upper division engineering courses.

Humanities and Social Sciences (H/SS) Requirement

To promote a rich and varied educational experience outside of the technical requirements for each major, the College of Engineering has a six-course Humanities and Social Sciences breadth requirement (http://engineering.berkeley.edu/student-services/degree-requirements/humanities-and-social-sciences), which must be completed to graduate. This requirement, built into all the engineering programs of study, includes two reading and composition courses (R&C), and four additional courses within which a number of specific conditions must be satisfied. Follow these guidelines to fulfill this requirement:

1. Complete a minimum of six courses from the approved Humanities/Social Sciences (H/SS) lists (http://engineering.berkeley.edu/hssreq).
2. Courses must be a minimum of 3 semester units (or 4 quarter units).
3. Two of the six courses must fulfill the college's Reading and Composition (R&C) requirement. These courses must be taken for a letter grade (C- or better required) and must be completed by no later than the end of the sophomore year (fourth semester of enrollment). The first half of R&C, the “A” course, must be completed by the end of the freshman year; the second half of R&C, the “B" course, must be completed by no later than the end of the sophomore year. Use the Class Schedule (http://classes.berkeley.edu) to view R&C courses offered in a given semester. View the list of exams (http://engineering.berkeley.edu/academics/undergraduate-guide/exams) that can be applied toward the first half of the R&C requirement. Note: Only the first half of R&C can be fulfilled with an AP or IB exam score. Test scores do not fulfill the second half of the R&C requirement for College of Engineering students.

4. The four additional courses must be chosen within College of Engineering guidelines from the H/SS lists (see below). These courses may be taken on a Pass/Not Passed basis (P/NP).
5. Two of the six courses must be upper division (courses numbered 100-196).
6. One of the six courses must satisfy the campus American Cultures requirement. For detailed lists of courses that fulfill American Cultures requirements, visit the American Cultures (http://guide.berkeley.edu/archive/2018-19/undergraduate/colleges-schools/engineering/american-cultures-requirement)site.
7. A maximum of two exams (Advanced Placement, International Baccalaureate, or A-Level) may be used toward completion of the H/SS requirement. View the list of exams (http://engineering.berkeley.edu/academics/undergraduate-guide/exams) that can be applied toward H/SS requirements.
8. Courses may fulfill multiple categories. For example, CY PLAN 118AC (http://guide.berkeley.edu/search/?P=CY%20PLAN%20118AC) satisfies both the American Cultures requirement and one upper division H/SS requirement.
9. No courses offered by any engineering department other than BIO ENG 100 (http://guide.berkeley.edu/search/?P=BIO%20ENG%20100), COMPSCI C79 (http://guide.berkeley.edu/search/?P=COMPSCI%20C79), ENGIN 125 (http://guide.berkeley.edu/search/?P=ENGIN%20125), ENGIN 157AC (http://guide.berkeley.edu/search/?P=ENGIN%20157AC), and MEC ENG 191K (http://guide.berkeley.edu/search/?P=MEC%20ENG%20191K) may be used to complete H/SS requirements.
10. Foreign language courses may be used to complete H/SS requirements. View the list of language options (http://guide.berkeley.edu/archive/2018-19/undergraduate/colleges-schools/engineering/approved-foreign-language-courses).
11. Courses numbered 97, 98, 99, or above 196 may not be used to complete any H/SS requirement.
12. The College of Engineering uses modified versions of five of the College of Letters and Science (L&S) breadth requirements lists to provide options to our students for completing the H/SS requirement. The five areas are:

    - Arts and Literature
    - Historical Studies
    - International Studies
    - Philosophy and Values
    - Social and Behavioral Sciences

    Within the guidelines above, choose courses from any of the Breadth areas listed above. (Please note that you *cannot* use courses on the Biological Science or Physical Science Breadth list to complete the H/SS requirement.) To find course options, go to the Class Schedule (http://classes.berkeley.edu), (http://classes.berkeley.edu/search/class) select the term of interest, and use the Breadth Requirements (https://ls.berkeley.edu/sites/default/files/breadth_search_annotation_in_guide.png) filter.

Class Schedule Requirements

- Minimum units per semester: 12.0
- Maximum units per semester: 20.5
- Minimum technical courses: College of Engineering undergraduates must enroll each semester in no fewer than two technical courses (of a minimum of 3 units each) required of the major program of study in which the student is officially declared. (Note: For most majors, normal progress will require enrolling in 3-4 technical courses each semester).
- All technical courses (math, science, engineering) that satisfy requirements for the major must be taken on a letter-graded basis (unless only offered as P/NP).

Minimum Academic (Grade) Requirements

- A minimum overall and semester grade point average of 2.00 (C average) is required of engineering undergraduates. Students will be subject to dismissal from the University if during any fall or spring semester their overall UC GPA falls below a 2.00, or their semester GPA is less than 2.00.
- Students must achieve a minimum grade point average of 2.00 (C average) in upper division technical courses required for the major curriculum each semester.
- A minimum overall grade point average of 2.00, and a minimum 2.00 grade point average in upper division technical course work required for the major is needed to earn a Bachelor of Science in Engineering.

Unit Requirements

To earn a Bachelor of Science in Engineering, students must complete at least 120 semester units of courses subject to certain guidelines:

- Completion of the requirements of one engineering major program (https://engineering.berkeley.edu/academics/undergraduate-guide/degree-requirements/major-programs) of study.
- A maximum of 16 units of special studies coursework (courses numbered 97, 98, 99, 197, 198, or 199) is allowed towards the 120 units.
- A maximum of 4 units of physical education from any school attended will count towards the 120 units.
- Students may receive unit credit for courses graded P (including P/NP units taken through EAP) up to a limit of one-third of the total units taken and passed on the Berkeley campus at the time of graduation.

Normal Progress

Students in the College of Engineering must enroll in a full-time program and make normal progress each semester toward the bachelor's degree. The continued enrollment of students who fail to achieve minimum academic progress shall be subject to the approval of the dean. (Note: Students with official accommodations established by the Disabled Students' Program, with health or family issues, or with other reasons deemed appropriate by the dean may petition for an exception to normal progress rules.)

University of California Requirements

Entry Level Writing (http://guide.berkeley.edu/archive/2018-19/undergraduate/colleges-schools/natural-resources/entry-level-writing-requirement)

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing Requirement. Satisfaction of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley.

American History and American Institutions (http://guide.berkeley.edu/archive/2018-19/undergraduate/colleges-schools/natural-resources/american-history-institutions-requirement)

The American History and Institutions requirements are based on the principle that a U.S. resident graduated from an American university should have an understanding of the history and governmental institutions of the United States.

Campus Requirement

American Cultures (http://guide.berkeley.edu/archive/2018-19/undergraduate/colleges-schools/natural-resources/american-cultures-requirement)

American Cultures (AC) is the one requirement that all undergraduate students at UC Berkeley need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity, and culture in the United States. AC courses offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

For more detailed information regarding the courses listed below (e.g., elective information, GPA requirements, etc.), see the College Requirements and Major Requirements tabs.

				Freshman
Fall	**Units**	**Spring**		**Units**
MATH 1A	4	MATH 1B		4
CHEM 1A	3	PHYSICS 7A		4
COMPSCI C8, INFO C8, or STAT C8	4	CIV ENG 93		3
Reading and Composition course from List A	4	Reading and Composition course from List B		4
	15			**15**
				Sophomore
Fall	**Units**	**Spring**		**Units**
MATH 53	4	MATH 54		4
PHYSICS 7B	4	CIV ENG C30 or MEC ENG C85		3
Basic Science Elective[1]	3-4	CIV ENG 60		3
Humanities/Social Sciences course	3-4	ENGIN 7		4
	14-16			**14**
				Junior
Fall	**Units**	**Spring**		**Units**
CIV ENG 100 or 130N	3-4	CIV ENG 11		3
ENGIN 40, MEC ENG 40, MEC ENG 104, EECS 127, or COMPSCI C100	3-4	CEE Applications Electives[2]		6
CEE Applications Elective[2]	3	Humanities/ Social Sciences course		3-4
Humanities/Social Sciences course	3-4	Free Elective		3
Free Elective	3			
	15-18			**15-16**
				Senior
Fall	**Units**	**Spring**		**Units**
CIV ENG 167	3	CEE Extensions Elective[3]		3
CEE Extensions Electives[3]	6	Capstone Design Elective[4]		3-4
Humanities/Social Sciences course	3-4	Free Electives		8
Free Electives	6			
	18-19			**14-15**

Total Units: 120-128

1 Basic Science Elective - Choose one course from the following: BIOLOGY 1B, CHEM 1B, or CIV ENG 70.

2 CEE Applications - Choose three courses (9 units) from the following: CIV ENG 103, CIV ENG 111, CIV ENG 120, CIV ENG 155, CIV ENG 175, CIV ENG 191.

3 CEE Extensions - Complete nine units chosen from upper division CIV ENG courses not being counted toward other major requirements. Students may use up to three units of CIV ENG graduate courses numbered 200-295, taken Fall 2017 or later, toward their CEE Extensions units. Students must have a technical GPA of 3.0 or higher to obtain permission to enroll in CEE graduate courses. Students may receive up to three units of credit toward their CEE Extensions units for work on a research project in CIV ENG H194 (Honors Undergraduate Research).

4 Capstone Design - Choose one course from the following: CIV ENG 105, CIV ENG 112, CIV ENG 122N and CIV ENG 122L, CIV

Mission

The Civil Engineering undergraduate program educates engineering leaders who will contribute to solving societal problems by improving the civil infrastructure, resource protection, natural hazard mitigation, and the efficient and sustainable functioning of engineered and natural systems in California, the United States, and the world. These objectives are achieved by:

- Educating students with fundamental mathematical, scientific, and engineering knowledge to have a significant and positive long-term impact on the field of civil and environmental engineering.
- Inspiring students and preparing them for successful professional careers, for further studies in high-quality graduate programs in engineering or other professional fields, and for a lifetime of learning.
- Emphasizing the importance of professional and personal ethics, business and management leadership, and service to society.

Learning Goals for the Major

1. Ability to apply knowledge of mathematics, science, and engineering.
2. Ability to design and conduct experiments, as well as to analyze and interpret data.
3. Ability to design a system, component, or process to meet desired needs.
4. Ability to function on multidisciplinary teams.
5. Ability to identify, formulate, and solve engineering problems.
6. Understanding of professional and ethical responsibility.
7. Ability to communicate effectively.
8. Understand the impact of engineering solutions in a global and societal context.
9. Recognition of the need for, and an ability to engage in life-long learning.
10. Knowledge of contemporary issues.

11. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Faculty Advisers

Students in CEE are encouraged to seek mentoring from CEE faculty advisers.

Faculty advisers (and, indeed, all faculty members) hold office hours throughout the school year to help students with course content; to advise on courses, career objectives and graduate school; to provide guidance about summer internships; to mentor students researchers; and to write letters of recommendation as appropriate. They also can be contacted (by e-mail or phone) to schedule an appointment.

CEE students should meet with a faculty adviser of their choice at least twice a year for academic advising. The department hosts Academic Advising Forums each semester to facilitate advising. The faculty adviser reviews the student's proposed academic schedule, suggests coursework based on the student's interest and offers mentoring for career development. If a student struggles academically, as evidenced by their GPA, the department will require academic advising prior to enrollment in classes the following semester.

College of Engineering Advising

Students are also assigned an engineering student services (ESS) adviser in the College of Engineering. ESS advisers help with a wide range of issues by assisting with course selection and academic decision-making, suggesting enrichment opportunities, explaining graduation requirements and college policies, monitoring progress towards the degree, and providing support or referrals to campus resources to help students reach their academic and personal goals. Explore the ESS website (http://engineering.berkeley.edu/student-services/advising) for detailed information on advising services.

Departmental Advising

CEE's undergraduate adviser answers registration questions, assists with course selection and academic decision-making, describes courses, interprets departmental policy, and makes referrals to resources on campus. The department's undergraduate adviser is located in the CEE Academic Affairs Office, 750 Davis Hall.

Further Information

See CEE Advising (http://www.ce.berkeley.edu/undergrad/advising) for more advising resources.

Student Organizations

Join one or more of the active student organizations with CEE and the College of Engineering. Learn to apply CEE knowledge outside of the classroom, get leadership and teamwork experience, meet students with similar interests, go on tours and field trips, and participate in community service projects.

CEE organizations

- ASCE Student Chapter (https://www.asce.berkeley.edu) has a membership of over 230 students.
- Chi Epsilon (http://www.ocf.berkeley.edu/%7Echiep) is the undergraduate honor society in CEE (invitation only).
- Competition teams: Concrete Canoe team (https://callink.berkeley.edu/organization/concretecanoe), Steel Bridge team (https://steelbridge.berkeley.edu), Environmental team (https://www.facebook.com/calenvironmental), Construction team (http://calconstructionteam.wixsite.com/construction), Transportation team (https://ite.berkeley.edu/cal-transportation-team), and the Seismic Design team (https://www.facebook.com/CalSeismicDesign).
- Institute of Transportation Engineers Student Chapter (https://ite.berkeley.edu).

COE organizations

- Society of Women Engineers (http://swe.berkeley.edu) (SWE)
- Engineers Without Borders (http://ewb.berkeley.edu) (EWB)
- Engineers for a Sustainable World (http://eswberkeley.weebly.com) (ESW)

Undergraduate Participation in Research

Gain hands-on research experience while at Berkeley. Research experience adds to the quality of the undergraduate program and introduces students to the importance of graduate study.

Research opportunities

- COE's u (http://coe.berkeley.edu/students/current-undergraduates/student-research)ndergraduate research opportunities (http://coe.berkeley.edu/students/current-undergraduates/student-research)
- Undergraduate Research at Berkeley (http://research.berkeley.edu)
- Berkeley Undergraduate Research Apprentice Program (http://research.berkeley.edu/urap)
- Supervised independent study (http://www.ce.berkeley.edu/undergrad/curriculum) CIV ENG 99, CIV ENG 199, and CIV ENG H194). Receive course credit.
- Competition teams: Concrete Canoe (https://callink.berkeley.edu/organization/concretecanoe), Steel Bridge (https://steelbridge.berkeley.edu), Environmental (https://www.facebook.com/calenvironmental), Construction (http://calconstructionteam.wixsite.com/construction), Transportation (https://ite.berkeley.edu/cal-transportation-team) and Seismic Design (https://www.facebook.com/CalSeismicDesign).
- Laboratory volunteer

Study Abroad

Civil and environmental engineering is a profession that depends on collaboration with colleagues nationally and internationally. Thus, the department strongly encourages its students to expand their horizons through an international educational experience. See Berkeley's extensive Education Abroad Program (http://eap.ucop.edu/Pages/index-new.html).

Civil Engineering

Expand all course descriptions [+]Collapse all course descriptions [-]

CIV ENG 11 Engineered Systems and Sustainability 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
An introduction to key engineered systems (e.g., energy, water supply, buildings, transportation) and their environmental impacts. Basic principles of environmental science needed to understand natural processes as they are influenced by human activities. Overview of concepts and methods of sustainability analysis. Critical evaluation of engineering approaches to address sustainability.
Engineered Systems and Sustainability: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A and MATH 1A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Harley, Horvath, Nelson

Engineered Systems and Sustainability: Read Less [-]

CIV ENG 24 Freshman Seminars 1 Unit

Terms offered: Spring 2020, Fall 2019, Spring 2019
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Freshman Seminars: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

Freshman Seminars: Read Less [-]

CIV ENG C30 Introduction to Solid Mechanics 3 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
A review of equilibrium for particles and rigid bodies. Application to truss structures. The concepts of deformation, strain, and stress. Equilibrium equations for a continuum. Elements of the theory of linear elasticity. The states of plane stress and plane strain. Solution of elementary elasticity problems (beam bending, torsion of circular bars). Euler buckling in elastic beams.
Introduction to Solid Mechanics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 53 and 54 (may be taken concurrently); Physics 7A

Credit Restrictions: Students will receive no credit for Mechanical Engineering C85/Civil and Environmental Engineering C30 after completing Mechanical Engineering W85. A deficient grade in Mechanical Engineering W85 may be removed by taking Mechanical Engineering C85/Civil and Environmental Engineering C30.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer:
6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week
10 weeks - 4.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Armero, Papadopoulos, Zohdi, Johnson

Also listed as: MEC ENG C85

Introduction to Solid Mechanics: Read Less [-]

CIV ENG W30 Introduction to Solid Mechanics 3 Units

Terms offered: Summer 2020 8 Week Session, Summer 2019 8 Week Session, Summer 2018 8 Week Session
A review of equilibrium for particles and rigid bodies. Application to truss structures. The concepts of deformation, strain, and stress. Equilibrium equations for a continuum. Elements of the theory of linear elasticity. The states of plane stress and plane strain. Solution of elementary elasticity problems (beam bending, torsion of circular bars). Euler buckling in elastic beams.
Introduction to Solid Mechanics: Read More [+]
Objectives Outcomes

Course Objectives: To learn statics and mechanics of materials

Student Learning Outcomes: -
Correctly draw free-body
-
Apply the equations of equilibrium to two and three-dimensional solids
-
Understand the concepts of stress and strain
-
Ability to calculate deflections in engineered systems
-
Solve simple boundary value problems in linear elastostatics (tension, torsion, beam bending)

Rules & Requirements

Prerequisites: MATH 53 and MATH 54 (may be taken concurrently); PHYSICS 7A

Credit Restrictions: Students will receive no credit for MEC ENG W85 after completing MEC ENG C85. A deficient grade in MEC ENG W85 may be removed by taking MEC ENG C85.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of web-based lecture and 1 hour of web-based discussion per week

Summer:
6 weeks - 7.5 hours of web-based lecture and 2.5 hours of web-based discussion per week
8 weeks - 6 hours of web-based lecture and 2 hours of web-based discussion per week
10 weeks - 4.5 hours of web-based lecture and 1.5 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Govindjee

Also listed as: MEC ENG W85

Introduction to Solid Mechanics: Read Less [-]

CIV ENG 60 Structure and Properties of Civil Engineering Materials 3 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Introduction to structure and properties of civil engineering materials such as asphalt, cements, concrete, geological materials (e.g. soil and rocks), steel, polymers, and wood. The properties range from elastic, plastic and fracture properties to porosity and thermal and environmental responses. Laboratory tests include evaluation of behavior of these materials under a wide range of conditions.
Structure and Properties of Civil Engineering Materials: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Monteiro, Ostertag

Structure and Properties of Civil Engineering Materials: Read Less [-]

CIV ENG 70 Engineering Geology 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Principles of physical and structural geology; the influence of geological factors on engineering works and the environment. Field trip.
Engineering Geology: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Glaser, Sitar

Engineering Geology: Read Less [-]

CIV ENG 88B Time Series Analysis: Sea Level Rise and Coastal Flooding 2 Units

Terms offered: Spring 2017
In this course, we will pursue analysis of long-term records of coastal water levels in the context of sea level rise. We will cover the collection, evaluation, visualization and analysis of time series data using long-term records of sea levels from coastal sites around the world. Specific topics will include extreme events and distributions, frequency-based descriptions, averaging, filtering, harmonic analysis, trend identification, extrapolations, and decision-making under uncertainty.
Time Series Analysis: Sea Level Rise and Coastal Flooding: Read More [+]

Rules & Requirements

Prerequisites: Concurrent or prior enrollment in Foundations of Data Science (COMPSCI C8 / INFO C8 / STAT C8) and MATH 1A

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Stacey

Time Series Analysis: Sea Level Rise and Coastal Flooding: Read Less [-]

CIV ENG C88 Data Science for Smart Cities 2 Units

Terms offered: Spring 2020
Cities become more dependent on the data flows that connect infrastructures between themselves, and users to infrastructures. Design and operation of smart, efficient, and resilient cities nowadays require data science skills. This course provides an introduction to working with data generated within transportation systems, power grids, communication networks, as well as collected via crowd-sensing and remote sensing technologies, to build demand- and supply-side urban services based on data analytics.
Data Science for Smart Cities: Read More [+]

Objectives Outcomes

Course Objectives: Become familiar with urban big data and sensor data collection techniques.

Develop intuition in various machine learning classification algorithms, as well as regression modelling.
Develop intuition in various machine learning classification algorithms, as well as regression modelling.
Foster critical thinking about real-world actionability from analytics.
Learn how to use data science techniques in urban decision-making and scenario generation.

Student Learning Outcomes: Develop capabilities in a range of data science techniques.

Gain the ability to solve problems in smart city research and practice.
Think critically about how to assess analytics for cities.
Use data analytics in the smart city domain.

Rules & Requirements

Prerequisites: This course is a Data Science connector course and is meant to be taken concurrent with or after Foundations of Data Science COMPSCI C8/INFO C8/STAT C8. Students may take more than one Data Science connector course if they wish, concurrently or after taking the C8 course

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Gonzalez

Formerly known as: Civil and Environmental Engineering 88

Also listed as: CY PLAN C88

Data Science for Smart Cities: Read Less [-]

CIV ENG 92 Introduction to Civil and Environmental Engineering 1 Unit

Terms offered: Fall 2019, Fall 2018, Fall 2017
A course designed to familiarize the entering student with the nature and scope of civil and environmental engineering and its component specialty areas.
Introduction to Civil and Environmental Engineering: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Introduction to Civil and Environmental Engineering: Read Less [-]

CIV ENG 93 Engineering Data Analysis 3 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Application of the concepts and methods of probability theory and statistical inference to CEE problems and data; graphical data analysis and sampling; elements of set theory; elements of probability theory; random variables and expectation; simulation; statistical inference. Use of computer programming languages for analysis of CEE-related data and problems. The course also introduces the student to various domains of uncertainty analysis in CEE.
Engineering Data Analysis: Read More [+]
Rules & Requirements

Prerequisites: ENGIN 7 or COMPSCI C8 / INFO C8 / STAT C8. Student should consult instructor prior to enrolling

Credit Restrictions: Students will receive no credit after taking Statistics 25.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Summer: 6 weeks - 5 hours of lecture and 7.5 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Hansen, Rubin, Walker

Engineering Data Analysis: Read Less [-]

CIV ENG 98 Supervised Group Study and Research 1 - 3 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Supervised group study and research by lower division students.
Supervised Group Study and Research: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Group Study and Research: Read Less [-]

CIV ENG 99 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Supervised independent study by lower division students.
Supervised Independent Study and Research: Read More [+]
Rules & Requirements

Prerequisites: Freshman or sophomore standing and consent of instructor. Minimum grade point average of 3.3 required

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer: 8 weeks - 2-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study and Research: Read Less [-]

CIV ENG 100 Elementary Fluid Mechanics 4 Units

Terms offered: Fall 2019, Fall 2018, Summer 2018 8 Week Session
Fluid statics and dynamics, including laboratory experiments with technical reports. Fundamentals: integral and differential formulations of the conservation laws are solved in special cases such as boundary layers and pipe flow. Flow visualization and computation techniques are introduced using Matlab. Empirical equations are used for turbulent flows, drag, pumps, and open channels. Principles of empirical equations are also discussed: dimensional analysis, regression, and uncertainty.
Elementary Fluid Mechanics: Read More [+]

Rules & Requirements

Prerequisites: PHYSICS 7A, MATH 53, and ENGIN 7 (may be taken concurrently); and CIV ENG C30 / MEC ENG C85 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Chow, Stacey, Variano

Elementary Fluid Mechanics: Read Less [-]

CIV ENG 101 Fluid Mechanics of Rivers, Streams, and Wetlands 3 Units

Terms offered: Fall 2014, Spring 2013, Fall 2010
Analysis of steady and unsteady open-channel flow and application to rivers and streams. Examination of mixing and transport in rivers and streams. Effects of channel complexity. Floodplain dynamics and flow routing. Interaction of vegetation and fluid flows. Freshwater and tidal marshes. Sediment transport in rivers, streams, and wetlands. Implications for freshwater ecosystem function.
Fluid Mechanics of Rivers, Streams, and Wetlands: Read More [+]

Rules & Requirements

Prerequisites: CIV ENG 100, MEC ENG 106, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Variano

Fluid Mechanics of Rivers, Streams, and Wetlands: Read Less [-]

CIV ENG 103 Introduction to Hydrology 3 Units

Terms offered: Fall 2018, Fall 2017, Spring 2017
Course addresses principles and practical aspects of hydrology. Topics in introduction to hydrology include hydrologic cycle, precipitation, evaporation, infiltration, snow and snowmelt, and streamflow; introduction to geomorphology, GIS (Geographic Information Systems) applications, theory of unit hydrograph, frequency analysis, flood routing through reservoirs and rivers; introduction to rainfall-runoff analyses, watershed modeling, urban hydrology, and introduction to groundwater hydrology.
Introduction to Hydrology: Read More [+]

Rules & Requirements

Prerequisites: CIV ENG 93 and CIV ENG 100

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Thompson

Introduction to Hydrology: Read Less [-]

CIV ENG C103N Terrestrial Hydrology 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2017, Spring 2014
A quantitative introduction to the hydrology of the terrestrial environment including lower atmosphere, watersheds, lakes, and streams. All aspects of the hydrologic cycle, including precipitation, infiltration, evapotranspiration, overland flow, streamflow, and groundwater flow. Chemistry and dating of groundwater and surface water. Development of quantitative insights through problem solving and use of simple models. This course requires one field experiment and several group computer lab assignments.
Terrestrial Hydrology: Read More [+]

Rules & Requirements

Prerequisites: CHEM 1A, MATH 1A, MATH 1B, and PHYSICS 7A; or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Larsen

Also listed as: ESPM C130/GEOG C136

Terrestrial Hydrology: Read Less [-]

CIV ENG 105 Water and Wind - Design for a Variable Environment 3 Units

Terms offered: Spring 2020, Fall 2017, Fall 2016
Hands-on design course in applied fluid mechanics, hydrology and water resources. Course goes beyond basic examples of fluid flow to develop environmental engineering solutions to real-world problems. A class team project is used to (1) explore the design process and project management; and (2) to integrate concepts from hydrology and fluid mechanics with structural, geotechnical and/or transportation engineering for a holistic design approach. Specific project topics vary with offering. Example topics include: engineering for air quality, design for sea-level rise mitigation, and development of alternative water supplies to address scarcity and post-disaster management.
Water and Wind - Design for a Variable Environment: Read More [+]
Objectives Outcomes

Course Objectives: To develop and defend design criteria
To gain familiarity with the process of design and project management, from proposal writing to preliminary design delivery
To integrate fundamental engineering principles, subject to the needs and constraints of a specific design.

Rules & Requirements

Prerequisites: CIV ENG 100 and CIV ENG 103; or instructor's permission

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Chow, Stacey, Variano

Water and Wind - Design for a Variable Environment: Read Less [-]

CIV ENG C106 Air Pollution 3 Units

Terms offered: Spring 2020, Spring 2018, Spring 2017
This course is an introduction to air pollution and the chemistry of earth's atmosphere. We will focus on the fundamental natural processes controlling trace gas and aerosol concentrations in the atmosphere, and how anthropogenic activity has affected those processes at the local, regional, and global scales. Specific topics include stratospheric ozone depletion, increasing concentrations of green house gasses, smog, and changes in the oxidation capacity of the troposphere.
Air Pollution: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 1A-1B, Physics 8A or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Goldstein

Also listed as: EPS C180/ESPM C180

Air Pollution: Read Less [-]

CIV ENG 107 Climate Change Mitigation 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Assessment of technological options for responding to climate change. Overview of climate-change science; sources, sinks, and atmospheric dynamics of greenhouse gases. Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases. Societal context for implementing engineered responses.
Climate Change Mitigation: Read More [+]
Rules & Requirements

Prerequisites: Upper division or graduate standing in engineering or physical science, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Climate Change Mitigation: Read Less [-]

CIV ENG 110 Water Systems of the Future 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2017
This course will familiarize students with the complex infrastructure used to meet human water demands; competing uses and demands; water and wastewater infrastructure; technologies to enable recovery of water, energy, and other resources from wastewater; supply planning; trends and forecasting; costs, pricing and financing; environmental justice; methods to assess sustainability; regulatory, policy and institutional challenges; and water's contribution to other sectors (e.g., energy, food, buildings). Innovation, both barriers and opportunities, will be highlighted. California and the U.S. will be emphasized but global challenges will be discussed. Students will study, critique, and recommend improvements for a real-world system.
Water Systems of the Future: Read More [+]
Objectives Outcomes

Course Objectives: Consider costs and tradeoffs in water supply planning under uncertainty for real-world water systems
Critically evaluate water planning and innovation potential for real-world utilities given future uncertainties and competing priorities.
Explore the innovation ecosystem in the water sector, its opportunities and challenges, and analyze case studies
Introduce the technologies that are currently in use for treating and managing water and wastewater, as well as innovations that have the potential to dramatically change water infrastructure.
Provide overview and examples of concepts and methods for analyzing the sustainability of water systems
Provide overview of the complex infrastructure systems that supply and manage water and wastewater.

Student Learning Outcomes: Ability to apply knowledge of mathematics, science, and engineering. MODERATE
Ability to communicate effectively. EXTENSIVE
Ability to design a system, component, or process to meet desired needs. MODERATE
Ability to function on multi-disciplinary teams. EXTENSIVE
Ability to identify, formulate and solve engineering problems. MODERATE
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. MODERATE
Knowledge of contemporary issues. EXTENSIVE
Recognition of the need for, and an ability to engage in life-long learning. EXTENSIVE
Understand the impact of engineering solutions in a global and societal context. EXTENSIVE
Understanding of professional and ethical responsibility. EXTENSIVE

Rules & Requirements

Prerequisites: Upper division status or consent of the instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Nelson

Water Systems of the Future: Read Less [-]

CIV ENG 111 Environmental Engineering 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Quantitative overview of air and water contaminants and their engineering control. Elementary environmental chemistry and transport. Reactor models. Applications of fundamentals to selected current issues in water quality engineering, air quality engineering, air quality engineering, and hazardous waste management.
Environmental Engineering: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing in engineering or physical sciences, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Alvarez-Cohen, Nelson, Sedlak

Environmental Engineering: Read Less [-]

CIV ENG 111L Water and Air Quality Laboratory 1 Unit

Terms offered: Fall 2019, Fall 2018, Fall 2017
This laboratory course is designed to accompany the lecture topics in Civil Engineering 111. Each laboratory activity will provide an opportunity to understand key concepts in water and air quality through hands-on experimentation. Laboratory topics include phase partitioning, acid/base reactions, redox reactions, biochemical oxygen demand, absorption, gas transfer, reactor hydraulics, particle destablization, disinfection, and combustion emissions.
Water and Air Quality Laboratory: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 111 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Alvarez-Cohen, Nelson, Sedlak

Water and Air Quality Laboratory: Read Less [-]

CIV ENG 112 Environmental Engineering Design 3 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015
Engineering design and project management of environmental systems. Students will complete a design project focusing on pollution control in a selected environmental system. Lectures and project activities will address process design, economic optimization, legal and institutional constraints on design, and project management. Additional components of design (e.g., hydraulics, engineering sustainability, plant structures) will be included.
Environmental Engineering Design: Read More [+]

Rules & Requirements

Prerequisites: CIV ENG 100 and CIV ENG 111

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Environmental Engineering Design: Read Less [-]

CIV ENG 113 Ecological Engineering for Water Quality Improvement 3 Units

Terms offered: Spring 2019, Spring 2017, Fall 2003
Ecological engineering approaches for treating contaminated water using natural processes to improve water quality. Emphasis on combining basic science and engineering approaches to understand the fundamental processes that govern the effectiveness of complex natural treatment systems. Applications include constructed wetlands, waste stabilization ponds, stormwater bioretention, decentralized wastewater management, ecological sanitation. Laboratory sessions will consist of design and monitoring of laboratory and full-scale natural treatment systems, including a range of water quality measurements.
Ecological Engineering for Water Quality Improvement: Read More [+]

Objectives Outcomes

Course Objectives: Become familiar with common applications of natural treatment systems through lectures, reading materials, laboratory activities, and field trips
Develop a solid understanding of the fundamental processes in ecological engineering approaches to natural treatment systems that govern the removal or transformation of contaminants in water

Learn common design approaches for waste stabilization ponds and wetlands, as well as their necessary operation and maintenance activities
Measure key water quality parameters and evaluate the performance of mesocosm ponds and wetlands based on the data collected throughout the semester
Understand and appreciate the complexity of these systems compared to mechanical treatment systems

Student Learning Outcomes: Ability to apply knowledge of mathematics, science, and engineering. EXTENSIVE
Ability to communicate effectively. MODERATE
Ability to design a system, component, or process to meet desired needs. EXTENSIVE
Ability to design and conduct experiments, as well as to analyze and interpret data. EXTENSIVE
Ability to function on multi-disciplinary teams. MODERATE
Ability to identify, formulate and solve engineering problems. EXTENSIVE
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. EXTENSIVE
Knowledge of contemporary issues. MODERATE
Recognition of the need for, and an ability to engage in life-long learning. MODERATE
Understand the impact of engineering solutions in a global and societal context. MODERATE
Understanding of professional and ethical responsibility. MODERATE

Rules & Requirements

Prerequisites: CIV ENG 111 or consent of instructor

Credit Restrictions: Civ Eng 113N

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Nelson

Formerly known as: Civil and Environmental Engineering 113N

CIV ENG 114 Environmental Microbiology 3 Units

Terms offered: Spring 2016, Spring 2015, Fall 2014
The scope of modern environmental engineering requires a fundamental knowledge of microbial processes with specific application to water, wastewater and the environmental fate of pollutants. This course will cover basic microbial physiology, biochemistry, metabolism, growth energetics and kinetics, ecology, pathogenicity, and genetics for application to both engineered and natural environmental systems.
Environmental Microbiology: Read More [+]
Rules & Requirements

Prerequisites: CHEM 1A and CHEM 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Alvarez-Cohen

Environmental Microbiology: Read Less [-]

CIV ENG 115 Water Chemistry 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
The application of principles of inorganic, physical, and dilute solution equilibrium chemistry to aquatic systems, both in the aquatic environment and in water and wastewater treatment processes.
Water Chemistry: Read More [+]
Rules & Requirements

Prerequisites: Upper division or graduate standing in engineering or physical science, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sedlak

Water Chemistry: Read Less [-]

CIV ENG C116 Chemistry of Soils 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016
Chemical mechanisms of reactions controlling the fate and mobility of nutrients and pollutants in soils. Role of soil minerals and humus in geochemical pathways of nutrient biovailability and pollutant detoxification. Chemical modeling of nutrient and pollutant soil chemistry. Applications to soil acidity and salinity.
Chemistry of Soils: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 111

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: ESPM C128

Chemistry of Soils: Read Less [-]

CIV ENG 120 Structural Engineering 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Introduction to design and analysis of structural systems. Loads and load placement. Proportioning of structural members in steel, reinforced concrete, and timber. Structural analysis theory. Hand and computer analysis methods, validation of results from computer analysis. Applications, including bridges, building frames, and long-span cable structures.
Structural Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 and CIV ENG 60 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Moehle

Structural Engineering: Read Less [-]

CIV ENG 121 Structural Analysis 3 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016
Theory and application of structural analysis. Stiffness and flexibility methods, with emphasis on the direct stiffness method. Equilibrium and compatibility. Virtual work. Response of linear and simple nonlinear structures to static loads. Use of computer programs for structural analysis. Modeling of two- and three-dimensional structures. Verification and interpretation of structural response.
Structural Analysis: Read More [+]
Objectives Outcomes

Course Objectives: Collapse load factor determination of simple structures by lower bound theorem of plastic analysis.
Consistent process of writing equilibrium and compatibility relations for small and large structures permitting solution by hand and by matrix algebra software. Identification of degree of static indeterminacy.
Force-deformation relations for truss and frame elements
Modeling of structures. Nodes, elements, loading, organization of information for describing structural model, element properties and loading
Solution of simple statically indeterminate structures by the force method of analysis. Understanding of structure flexibility and flexibility coefficients. Treatment of nodal loads and non-mechanical element deformations
Solution of statically indeterminate structures of any size by the displacement method of analysis. Stiffness coefficients. Treatment of element and thermal loads. Computer implementation in the form of the direct stiffness approach
Structural systems and their use in buildings and bridges. Parametric studies
Work and energy principles. Principles of virtual work and complementary virtual work. Relation between virtual work principles and equilibrium/ compatibility relations

Student Learning Outcomes: Analyze any type of truss and frame structure with the displacement method of analysis by hand and by computer. Determine internal forces, deformations, global displacements, support reactions. Error checking of computer analysis results (ABET Learning Goals: 1, 3, 5).
Determine the collapse load of simple perfectly-plastic truss and frame structures under equilibrium considerations (ABET Learning Goals: 1, 3, 5).
Identify the structural response contribution of individual elements and identify the effect of changes in element properties on the results (ABET Learning Goals: 1, 3, 11).
Perform analysis of statically determinate truss and frame structures under equilibrium and compatibility considerations. Perform equilibrium checks of given results under given loading. Perform compatibility checks for given deformations (ABET Learning Goals: 1, 3, 5).
Recognize force flow in beam, arch and cable structures and their derivatives, like suspension bridges, cable-stayed bridges, roofs and high-rise buildings (ABET Learning Goals: 3, 8, 10, 11).
Understand basic structural systems and their use throughout history and in modern times. (ABET Learning Goals: 3, 8, 10, 11)
Understand structural modeling.
Be able to assess the complexity of a structural model and identify number of unknowns in the solution of the structural response to given loading. Be able to select the most appropriate solution method for hand calculations (ABET Learning Goals: 1, 3, 5).

Rules & Requirements

Prerequisites: CIV ENG 120 and CIV ENG 130

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of

CIV ENG 122L Structural Steel Design Project 1 Unit

Terms offered: Spring 2020, Spring 2019, Spring 2018
Introduction to one or more comprehensive structural design problems. Design teams will conceive structural system; determine design loads; conduct preliminary and final design of structure and its foundation; prepare construction cost estimate; prepare final report containing project description, design criteria, cost estimate, structural drawings, and supporting calculations; and make "client" presentations as required.
Structural Steel Design Project: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 122N

Credit Restrictions: Students will receive no credit for Civil and Environmental Engineering 122L after taking Civil and Environmental Engineering 122 or 123L.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Becker

Structural Steel Design Project: Read Less [-]

CIV ENG 122N Design of Steel Structures 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Introduction to materials and methods of steel construction; behavior and design of tension members, compression members, flexural members and beam-columns; design of welds, bolts, shear connections and moment connections; design of spread footings or other foundation elements, inroduction to design of earthquake-resistant steel structures including concentrically braced frames and moment frames.
Design of Steel Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Becker

Formerly known as: Civil and Environmental Engineering 122

Design of Steel Structures: Read Less [-]

CIV ENG 123L Structural Concrete Design Project 1 Unit

Terms offered: Spring 2020, Spring 2019, Spring 2018
Introduction to one or more comprehensive structural design problems. Design teams will conceive structural system; determine design loads; conduct preliminary and final design of structure and its foundation; prepare construction cost estimate; prepare final report containing project description, design criteria, cost estimate, structural drawings, and supporting calculations; make "client" presentations as required.
Structural Concrete Design Project: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 123N

Credit Restrictions: Students will receive no credit for Civil and Environmental Engineering 123L after taking Civil and Environmental Engineering 122L or 123.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructors: Moehle, Mosalam

Structural Concrete Design Project: Read Less [-]

CIV ENG 123N Design of Reinforced Concrete Structures 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Introduction to materials and methods of reinforced concrete construction; behavior and design of reinforced concrete beams and one-way slabs considering deflections, flexure, shear, and anchorage; behavior and design of columns; design of spread footings or other foundation elements; design of earthquake-resistant structures; introduction to prestressed concrete.
Design of Reinforced Concrete Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Moehle, Mosalam

Formerly known as: Civil and Environmental Engineering 123

Design of Reinforced Concrete Structures: Read Less [-]

CIV ENG 124 Structural Design in Timber 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Characteristics and properties of wood as a structural material; design and detailing of structural elements and entire structures of wood. Topics include allowable stresses, design and detailing of solid sawn and glulam beams and columns, nailed and bolted connections, plywood diaphragms and shear walls. Case studies.
Structural Design in Timber: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 120

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Filippou

Structural Design in Timber: Read Less [-]

CIV ENG 126 Engineering Dynamics and Vibrations 3 Units

Terms offered: Fall 2019
Introduction to the dynamics of particles, rigid bodies, and deformable solids in civil engineering. Newtonian and Lagrangian formulations. Vibration of particles and rigid body systems: natural frequencies and mode shapes, free and forced vibration. Vibration of continuous systems: bars, strings, beams. Modeling and numerical simulation methods..
Engineering Dynamics and Vibrations: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 and ENGIN 7; or consent of instructor

Credit Restrictions: Students will receive no credit for CIV ENG 126 after completing MEC ENG 104. A deficient grade in CIV ENG 126 may be removed by taking MEC ENG 104, or MEC ENG 104.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Konstantinidis, DeJong

Engineering Dynamics and Vibrations: Read Less [-]

CIV ENG 130N Mechanics of Structures 3 Units

Terms offered: Spring 2019, Summer 2018 8 Week Session, Spring 2018
Elastic and plastic stress and deformation analysis of bars, shafts, beams, and columns; energy and variational methods; plastic analysis of structures; stability analysis of structures; computer-aided mathematical techniques for solution of engineering problems and modular computer programming methods.
Mechanics of Structures: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85; and CIV ENG 60 or MAT SCI 45

Credit Restrictions: Students will receive no credit for 130N after taking 130.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Summer: 8 weeks - 4 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Filippou, Govindjee, Li

Mechanics of Structures: Read Less [-]

CIV ENG 132 Applied Structural Mechanics 3 Units

Terms offered: Spring 2020
Concepts of theory of solid mechanics: three dimensional stress, strain, and material response; elastic and inelastic boundary value problems; fracture, fatigue, and geometric instability. Problems in advanced strength of materials; thin plate and axis-symmetric shell theory.
Applied Structural Mechanics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85, MATH 53 and MATH 54

Credit Restrictions: Students will receive no credit for CivEng 132 after CivEng 130N.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Govindjee, Li, Konstantinidis

Applied Structural Mechanics: Read Less [-]

CIV ENG C133 Engineering Analysis Using the Finite Element Method 3 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
This is an introductory course on the finite element method and is intended for seniors in engineering and applied science disciplines. The course covers the basic topics of finite element technology, including domain discretization, polynomial interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems. Finite element formulations for several important field equations are introduced using both direct and integral approaches. Particular emphasis is placed on computer simulation and analysis of realistic engineering problems from solid and fluid mechanics, heat transfer, and electromagnetism. The course uses FEMLAB, a multiphysics MATLAB-based finite element program that possesses a wide array of modeling capabilities and is ideally suited for instruction. Assignments will involve both paper- and computer-based exercises. Computer-based assignments will emphasize the practical aspects of finite element model construction and analysis.
Engineering Analysis Using the Finite Element Method: Read More [+]
Rules & Requirements

Prerequisites: Engineering 7 or 77 or Computer Science 61A; Mathematics 53 and 54; senior status in engineering or applied science

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: MEC ENG C180

Engineering Analysis Using the Finite Element Method: Read Less [-]

CIV ENG 140 Failure Mechanisms in Civil Engineering Materials 3 Units

Terms offered: Spring 2013, Spring 2010, Spring 2009
The failure mechanisms in civil engineering materials (cement-based materials, metallic- and polymer-based materials) are associated with processing, microstructure, stress states, and environmental changes. Fracture mechanics of brittle, quasi-brittle, and ductile materials; cracking processes in monolithic, particulate, and fiber reinforced materials; examples of ductile/brittle failure transitions in civil engineering structures; retrofitting of existing structures; non-destructive techniques for damage detection.
Failure Mechanisms in Civil Engineering Materials: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 60

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ostertag

Failure Mechanisms in Civil Engineering Materials: Read Less [-]

CIV ENG 153 Transportation Facility Design 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
A capstone class with the objective to design transportation facilities based on operational capacity, site constraints, and environmental design considerations. Emphasis on airports, including landside and airside elements, and environmental assessment and mitigation techniques.
Transportation Facility Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 155

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Hansen

Transportation Facility Design: Read Less [-]

CIV ENG 155 Transportation Systems Engineering 3 Units

Terms offered: Fall 2019, Spring 2019, Spring 2018
Operation, management, control, design, and evaluation of passenger and freight transportation systems. Their economic role. Demand analysis. Overall logistical structure. Performance models and modeling techniques: time-space diagrams, queuing theory, network analysis, and simulation. Design of control strategies for simple systems. Feedback effects. Paradoxes. Transportation impact modeling; noise; air pollution. Multi-criteria evaluation and decision making. Financing and politics.
Transportation Systems Engineering: Read More [+]

Rules & Requirements

Prerequisites: Sophomore standing in engineering or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Cassidy, Daganzo, Hansen, Kanafani, Madanat

Transportation Systems Engineering: Read Less [-]

CIV ENG 156 Infrastructure Planning and Management 3 Units

Terms offered: Fall 2014, Spring 2014, Fall 2011
This course focuses on physical infrastructure systems that support society, including transportation, communications, power, water, and waste. These are complex, large-scale systems that must be planned and managed over a long-term horizon. Economics-based, analytical tools are covered, including topics of supply, demand, and evaluation. Problem sets, case studies, and a class project provide for hands-on experience with a range of infrastructure systems, issues, and methods of analysis.
Infrastructure Planning and Management: Read More [+]

Rules & Requirements

Prerequisites: MATH 1A, MATH 1B, and CIV ENG 93

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Walker

Infrastructure Planning and Management: Read Less [-]

CIV ENG 165 Concrete Materials, Construction, and Sustainability 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Concrete materials: cements, supplementary cementitious materials, water, and admixtures. Sustainability analysis of concrete materials and mixtures. Development of special concretes: self-leveling concrete, high-performance concrete, and mass concrete. Consideration of sustainability of concrete construction methods used for buildings, highways, airfields, bridges, dams and other hydraulic structures. Non-destructive methods. Discussion of long-term durability. Comprehensive group projects.
Concrete Materials, Construction, and Sustainability: Read More [+]

Rules & Requirements

Prerequisites: CIV ENG 60

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Monteiro

Concrete Materials, Construction, and Sustainability: Read Less [-]

CIV ENG 166 Construction Engineering 3 Units

Terms offered: Fall 2018, Spring 2016, Fall 2014
Introduction to construction engineering and field operations. The construction industry, construction methods and practice, productivity improvement, equipment selection, site layout formwork, erection of steel and concrete structures. Labs demonstrate the concepts covered. Field trips to local construction projects.
Construction Engineering: Read More [+]

Rules & Requirements

Prerequisites: Upper division standing; CIV ENG 167 recommended

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Horvath

Construction Engineering: Read Less [-]

CIV ENG 167 Engineering Project Management 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Principles of economics, decision making, and law applied to company and project management. Business ownership, liability and insurance, cash flow analysis, and financial management. Project life-cycle, design-construction interface, contracts, estimating, scheduling, cost control.
Engineering Project Management: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 93 (can be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Ibbs, Tommelein

Engineering Project Management: Read Less [-]

CIV ENG 171 Rock Mechanics 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2017
Geological and geophysical exploration for structures in rock; properties and behavior of rock masses; rock slope stability; geological engineering of underground openings; evaluation of rock foundations, including dams.
Rock Mechanics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 70 or an introductory course in physical geology; and upper division standing in engineering

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Glaser

Rock Mechanics: Read Less [-]

CIV ENG 173 Groundwater and Seepage 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Introduction to principles of groundwater flow, including steady and transient flow through porous media, numerical analysis, pumping tests, groundwater geology, contaminant transport, and design of waste containment systems.
Groundwater and Seepage: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in engineering or science; CIV ENG 100 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Rubin, Sitar

Groundwater and Seepage: Read Less [-]

CIV ENG 174 Engineering Geomatics 3 Units

Terms offered: Summer 2015 First 6 Week Session, Summer 2014 10 Week Session, Summer 2014 First 6 Week Session
Engineering Geomatics is a field that integrates collections, processing, and analysis of digital geospatial data. This new field is anchored in the established field of geodetics that describes the complex shape of the Earth, elements and usage of topographic data and maps. Basic and advanced GPS satellite mapping. Digital globe technology. Advanced laser-LIDAR mapping. Quantitative terrain modeling, change detection, and analysis. Hydrogeomatics-seafloor mapping.
Engineering Geomatics: Read More [+]
Hours & Format

Summer: 6 weeks - 6 hours of lecture and 5 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Engineering Geomatics: Read Less [-]

CIV ENG 175 Geotechnical and Geoenvironmental Engineering 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Soil formation and identification. Engineering properties of soils. Fundamental aspects of soil characterization and response, including soil mineralogy, soil-water movement, effective stress, consolidation, soil strength, and soil compaction. Use of soils and geosynsynthetics in geotechnical and geoenvironmental applications. Introduction to site investigation techniques. Laboratory testing and evaluation of soil composition and properties.
Geotechnical and Geoenvironmental Engineering: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG C30 / MEC ENG C85 (may be taken concurrently); CIV ENG 100 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bray, Sitar, Soga

Geotechnical and Geoenvironmental Engineering: Read Less [-]

CIV ENG 176 Environmental Geotechnics 3 Units

Terms offered: Spring 2016, Spring 2015, Spring 2014
Principles of environmental geotechnics applied to waste encapsulation and remediation of contaminated sites. Characterization of soils and wastes, engineering properties of soils and geosynthetics and their use in typical applications. Fate and transport of contaminants. Fundamental principles and practices in groundwater remediation. Application of environmental geotechnics in the design and construction of waste containment systems. Discussion of soil remediation and emerging technologies.
Environmental Geotechnics: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175 or consent of instructor; CIV ENG 111 and CIV ENG 173 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sitar

Environmental Geotechnics: Read Less [-]

CIV ENG 177 Foundation Engineering Design 3 Units

Terms offered: Spring 2017, Spring 2016, Fall 2014
Principles of foundation engineering. Shear strength of soil and theories related to the analysis and design of shallow and deep foundations, and retaining structures. Structural design of foundation elements; piles, pile caps, and retaining structures. The course has a group project that incorporates both geotechnical and structural components of different foundation elements.
Foundation Engineering Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175; CIV ENG 120 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bray

Foundation Engineering Design: Read Less [-]

CIV ENG C178 Applied Geophysics 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
The theory and practice of geophysical methods for determining the subsurface distribution of physical rock and soil properties. Measurements of gravity and magnetic fields, electrical and electromagnetic fields, and seismic velocity are interpreted to map the subsurface distribution of density, magnetic susceptibility, electrical conductivity, and mechanical properties.
Applied Geophysics: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Rector

Also listed as: EPS C178

Applied Geophysics: Read Less [-]

CIV ENG 179 Geosystems Engineering Design 3 Units

Terms offered: Fall 2019, Fall 2018, Spring 2018
Geosystem engineering design principles and concepts. Fundamental aspects of the geomechanical and geoenvironmental responses of soil are applied to analyze and design civil systems, such as earth dams and levees, earth retention systems, building and bridge foundations, solid-waste fills, and tailings dams. Students form teams to design geotechnical aspects of a civil project and prepare/present a design document. Field trip to a project site.
Geosystems Engineering Design: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 175

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bray, Sitar, Soga

Geosystems Engineering Design: Read Less [-]

CIV ENG 180 Life-Cycle Design and Construction 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Course encompasses two design aspects of a civil and environmental engineering system: 1) Design of whole system, component, or life-cycle phase, subject to engineering standards and constraints, and 2) production system design (e.g., cost estimation and control, scheduling, commercial and legal terms, site layout design). Students form teams to address real-life projects and prepare project documentation and a final presentation.
Life-Cycle Design and Construction: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 167

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Horvath

Life-Cycle Design and Construction: Read Less [-]

CIV ENG 186 Design of Cyber-Physical Systems 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Design and prototype of large-scale technology intensive systems. Design project incorporating infrastruture systems and areas such as transportation and hydrology; for example, watershed sensor networks, robot networks for environmental management, mobile Internet monitoring, open societal scale systems, crowd-sources applications, traffic management. Design of sensing and control systems, prototyping systems, and measures of system performance. Modeling, software and hardware implementation.
Design of Cyber-Physical Systems: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 191

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructors: Bayen, Glaser, Sengupta

Design of Cyber-Physical Systems: Read Less [-]

CIV ENG 190 Special Topics in Civil and Environmental Engineering 1 - 4 Units

Terms offered: Spring 2016
This course covers current topics of interest in civil and environmental engineering. The course content may vary from semester to semester depending upon the instructor
Special Topics in Civil and Environmental Engineering: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Variano

Special Topics in Civil and Environmental Engineering: Read Less [-]

CIV ENG 191 Civil and Environmental Engineering Systems Analysis 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
This course is organized around five real-world large-scale CEE systems problems. The problems provide the motivation for the study of quantitative tools that are used for planning or managing these systems. The problems include design of a public transportation system for an urban area, resource allocation for the maintenance of a water supply system, development of repair and replacement policies for reinforced concrete bridge decks, traffic signal control for an arterial street, scheduling in a large-scale construction project.
Civil and Environmental Engineering Systems Analysis: Read More [+]
Rules & Requirements

Prerequisites: CIV ENG 93 and ENGIN 7

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bayen, Madanat, Sengupta

Formerly known as: 152

Civil and Environmental Engineering Systems Analysis: Read Less [-]

CIV ENG 192 The Art and Science of Civil and Environmental Engineering Practice 1 Unit

Terms offered: Fall 2017, Fall 2016, Fall 2015
A series of lectures by distinguished professionals designed to provide an appreciation of the role of science, technology, and the needs of society in conceiving projects, balancing the interplay of conflicting demands, and utilizing a variety of disciplines to produce unified and efficient systems.
The Art and Science of Civil and Environmental Engineering Practice: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in Civil Engineering

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

The Art and Science of Civil and Environmental Engineering Practice: Read Less [-]

CIV ENG 193 Engineering Risk Analysis 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Applications of probability theory and statistics in planning, analysis, and design of civil engineering systems. Development of probabilistic models for risk and reliability evaluation. Occurrence models; extreme value distributions. Analysis of uncertainties. Introduction to Bayesian statistical decision theory and its application in engineering decision-making.
Engineering Risk Analysis: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Li

Engineering Risk Analysis: Read Less [-]

CIV ENG H194 Honors Undergraduate Research 3 - 4 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Supervised research. Students who have completed 3 or more upper division courses may pursue original research under the direction of one of the members of the staff. A final report or presentation is required. A maximum of 4 units of H194 may be used to fulfill the technical elective requirement.
Honors Undergraduate Research: Read More [+]
Rules & Requirements

Prerequisites: Upper division technical GPA 3.3, consent of instructor and faculty advsior

Repeat rules: Course may be repeated for credit up to a total of 8 units.

Hours & Format

Fall and/or spring: 15 weeks - 3-4 hours of independent study per week

Summer:
6 weeks - 7.5-10 hours of independent study per week
8 weeks - 6-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Honors Undergraduate Research: Read Less [-]

CIV ENG 197 Field Studies in Civil Engineering 1 - 4 Units

Terms offered: Summer 2020 10 Week Session, Spring 2020, Fall 2019
Supervised experience in off-campus companies relevant to specific aspects and applications of civil engineering. Written report required at the end of the semester.
Field Studies in Civil Engineering: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 1.5-7.5 hours of fieldwork per week
10 weeks - 1.5-6 hours of fieldwork per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Field Studies in Civil Engineering: Read Less [-]

CIV ENG 198 Directed Group Study for Advanced Undergraduates 1 - 4 Units

Terms offered: Spring 2020, Fall 2019, Spring 2019
Group study of a selected topic or topics in civil engineering.
Directed Group Study for Advanced Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Senior standing in engineering

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Study for Advanced Undergraduates: Read Less [-]

CIV ENG 199 Supervised Independent Study 1 - 4 Units

Terms offered: Summer 2020 3 Week Session, Spring 2020, Fall 2019
Supervised independent study.
Supervised Independent Study: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor and major adviser. Enrollment is restricted; see the Course Number Guide for details

Credit Restrictions: Course may be repeated for a maximum of four units per semester.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week
10 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Civil and Environmental Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study: Read Less [-]