## CIVIL ENGINEERING (CIVL)

See Course Description Symbols and Terms (https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

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<td>Fall and spring</td>
<td>PHYS 204A (may be taken concurrently)</td>
<td>Lower Division</td>
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CIVL 175 Biological Processes in Environmental Engineering

**Prerequisite:** High school biology and chemistry.

**Typically Offered:** Fall and spring

Introduction to biological processes used in environmental engineering analysis and design with emphasis on sustainability. Ecosystem structure and function, population dynamics, biochemical reactions, photosynthesis, microbial ecology, growth and kinetics. Engineering applications in control of communicable disease, aerobic and anaerobic degradation of organic waste, water quality management, drinking water treatment, wastewater and solid waste treatment, biomass energy, phytotechnology, and bioremediation. 2 hours activity, 2 hours lecture. (021145)

**General Education:** Laboratory Activity (B3); Life Science (B2)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Lower Division; Sustainable Course

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CIVL 198 Special Topics

**Typically Offered:** Fall and spring

This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. 3 hours lecture. (001490)

**Grade Basis:** Graded

**Repeatability:** You may take this course more than once

**Course Attributes:** Lower Division

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CIVL 205 Civil Engineering Computing

**Typically Offered:** Fall and spring

Applications of spreadsheets, python programming, and spatial analysis via geographical informational systems (GIS) to civil engineering problems. 4 hours activity. (001488)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 2 units

**Course Attributes:** Lower Division; Laptop required

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CIVL 211 Statics

**Typically Offered:** Fall and spring

Force systems, moments, equilibrium, centroids, and moments of inertia. 2 hours activity, 2 hours discussion. (001489)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Lower Division
CIVL 212  Civil Engineering Materials  3 Units  
Prerequisite: CHEM 111.  
Typically Offered: Fall and spring  
The goal of this course is for you to develop an understanding of several types of material behaviors, with emphasis on materials commonly used in the civil engineering profession. Materials studied include wood, steel, concrete, soil, and asphalt paving materials. Technical writing and report formatting are emphasized as well. 2 hours activity, 2 hours lecture. (021735)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Lower Division  

CIVL 231  Introduction to Environmental Engineering  3 Units  
Prerequisite: CHEM 111, CIVL 175 (may be taken concurrently).  
Typically Offered: Fall and spring  
Introduction to environmental engineering and sustainability. Topics covered include: global and local environmental issues; UN's sustainable development goals; engineering in developing communities; life cycle assessment; material and energy balances; pollutant fate and transport; principles of green engineering; and environmental engineering pathways. 3 hours lecture. (021736)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Lower Division; Sustainable Course; Laptop required  

CIVL 302W  Engineering Sustainability and Economic Analysis (W)  3 Units W  
Prerequisite: GE Written Communication (A2) requirement; MATH 105 and MATH 119, or MATH 121; Junior standing.  
Typically Offered: Fall and spring  
This course provides a foundation for green engineering design through life cycle assessment and life cycle cost analysis considering economically viable, socially just, and environmentally sustainable solutions (triple bottom line). This course teaches quantitative environmental and economic assessment tools, decision-making strategies, risk, sensitivity analysis, and uncertainty analysis. These skills are applied to real-world problems through group projects, emphasizing applied engineering, critical thinking, communication skills and teamwork. 3 hours discussion. (001495)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division; Sustainable Course; Laptop required; Writing Course  

CIVL 311  Strength of Materials  4 Units  
Prerequisite: CIVL 211 with a grade of C- or higher; MATH 260 (may be taken concurrently); CIVL 212 or MECH 210 (may be taken concurrently).  
Typically Offered: Fall and spring  
Strength and elastic properties of materials of construction; tension, compression, shear, and torsion stresses; deflection and deformation; stress analysis of beams and columns. 4 hours discussion. (001491)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division  

CIVL 313  Structural Mechanics  3 Units  
Prerequisite: CIVL 311 with a grade of C- or higher; CIVL 205 (may be taken concurrently) or MECH 208 (may be taken concurrently).  
Typically Offered: Fall and spring  
Fundamentals of structural analysis for beams, trusses, and frames. Topics include loading (including seismic), influence lines, approximate analysis methods, deflection analysis, and statically indeterminate structures. Methods applicable to computer analysis are introduced. 3 hours discussion. (001499)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division; Laptop required  

CIVL 321  Fluid Mechanics  4 Units  
Prerequisite: CIVL 211 with a grade of C- or higher. Recommended: MATH 260, MECH 320 (may be taken concurrently).  
Typically Offered: Fall and spring  
Hydrostatics, principles of continuity, work-energy and momentum, viscous effects, dimensional analysis and similitude, flow in closed conduits, drag on objects. 3 hours discussion, 3 hours laboratory. (001496)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 4 units  
Course Attributes: Upper Division  

CIVL 331  Environmental Engineering Chemistry  3 Units  
Prerequisite: CIVL 231.  
Typically Offered: Fall only  
Chemical principles applicable to the analysis of natural and engineered water systems including acid base chemistry, precipitation and dissolution, oxidation-reduction, adsorption-desorption, and complexation. 2 hours activity, 2 hours lecture. (021737)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

CIVL 389  Internship in Civil Engr  1-3 Units  
Prerequisite: Approval of supervising faculty member prior to off-campus assignment.  
Typically Offered: Fall and spring  
This course is an internship offered for 1.0-3.0 units. You must register directly with a supervising faculty member. This program is designed for students who wish to gain practical work experience with participating civil engineering firms/organizations. 3 hours lecture. (001504)  
Grade Basis: Credit/No Credit  
Repeatability: You may take this course for a maximum of 15 units  
Course Attributes: Upper Division  

CIVL 389M  Summer Internship in Civil Engineering  1-3 Units  
Prerequisite: Approval of supervising faculty member prior to off-campus assignment.  
Typically Offered: Summer session only  
This course is an internship offered for 1.0 - 3.0 units. You must register directly with a supervising faculty member. This program is designed for students who wish to gain practical work experience with participating civil engineering firms/organizations. 0 hours supervision. (021287)  
Grade Basis: Credit/No Credit  
Repeatability: You may take this course for a maximum of 15 units  
Course Attributes: Upper Division
CIVL 398 Special Topics  
**Typically Offered:** Fall and spring  
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 0 hours lecture. (001505)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course more than once  
**Course Attributes:** Upper Division

CIVL 399 Special Problems  
**Typically Offered:** Fall and spring  
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (001506)  
**Grade Basis:** Credit/No Credit  
**Repeatability:** You may take this course for a maximum of 6 units  
**Course Attributes:** Upper Division

CIVL 411 Soil Mechanics and Foundations  
**Prerequisite:** GE Written Communication (A2) requirement; CIVL 321 (may be taken concurrently).  
**Typically Offered:** Spring only  
Soil properties, tests, and classification. Analysis of soil stresses, consolidation, shear strength, lateral pressures, and ground water movement. Related design consideration involving spread footings, piles, retaining walls, and slopes. Use of programmable scientific calculator required. 3 hours discussion, 3 hours laboratory. (001511)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 4 units  
**Course Attributes:** Upper Division

CIVL 413 Advanced Structures  
**Prerequisite:** CIVL 313.  
**Typically Offered:** Spring only  
Application of the material from CIVL 313 to advanced topics in structural analysis, including virtual work, second-order effects, the stiffness method, structural dynamics, and modal analysis. Use of computer software for the analysis of both two-dimensional and three-dimensional structural systems. Investigation of selected topics. 3 hours lecture. (021738)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Upper Division; Laptop required

CIVL 415 Reinforced Concrete Design  
**Prerequisite:** CIVL 313. Recommended: CIVL 411.  
**Typically Offered:** Fall only  
The analysis and design of reinforced concrete structures and elements by the strength design method. Laboratory includes experiments on concrete, concrete structural elements, and a design project. 3 hours discussion, 3 hours laboratory. (001514)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 4 units  
**Course Attributes:** Upper Division

CIVL 431 Water and Wastewater Engineering  
**Prerequisite:** CIVL 231 or faculty permission; junior standing.  
**Typically Offered:** Spring only  
Introduction to water quality, water supply, distribution, and drinking water treatment; wastewater collection, treatment, and disposal. Disease transmission; water quality parameters; physical, chemical, and biological processes in the treatment of water, wastewater, and biosolids. 3 hours discussion, 3 hours laboratory. (001529)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 4 units  
**Course Attributes:** Upper Division; Sustainable Course; Laptop required

CIVL 441 Transportation Engineering  
**Prerequisite:** CIVL 140; CIVL 302W (may be taken concurrently).  
**Typically Offered:** Fall only  
Transportation systems and facility planning, design, construction, operations, and maintenance. Pavement design and traffic engineering fundamentals. Laboratory includes field studies, design exercises, and modeling/forecasting tasks. 3 hours discussion, 3 hours laboratory. (001520)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 4 units  
**Course Attributes:** Upper Division; Sustainable Course

CIVL 451 Civil Engineering Competition A  
**Typically Offered:** Fall only  
This course prepares students for regional and national civil engineering competitions. Areas of preparation include writing proposals, developing a budget, team organization and leadership, engineering design, testing, technical report writing, and presentations. 2 hours activity. (022432)  
**Grade Basis:** Credit/No Credit  
**Repeatability:** You may take this course for a maximum of 2 units  
**Course Attributes:** Upper Division

CIVL 452 Civil Engineering Competition B  
**Typically Offered:** Spring only  
This course prepares students for regional and national civil engineering competitions. Areas of preparation include writing proposals, developing a budget, team organization and leadership, engineering design, testing, technical report writing, and presentations. 4 hours activity. (022433)  
**Grade Basis:** Credit/No Credit  
**Repeatability:** You may take this course for a maximum of 4 units  
**Course Attributes:** Upper Division; Sustainable Course

CIVL 461 Water Resources Engineering  
**Prerequisite:** CIVL 205 or MECH 208; CIVL 321 with a grade of C- or higher.  
**Typically Offered:** Spring only  
Water resources engineering covers principles of hydraulics and hydrology relevant to civil engineering applications. Topics include open channel hydraulics, rainfall-runoff predictions, ground water hydraulics, water budget modeling, storm water routing, and urban storm water management. 2 hours activity, 2 hours discussion. (021142)  
**Grade Basis:** Graded  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Upper Division; Sustainable Course; Laptop required
### Civil Engineering (CIVL)

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CIVL 558H Earthquake and Wind Engineering - Honors 3 Units
**Prerequisite:** CIVL 313, MATH 260. Recommended: Concurrent enrollment in or prior completion of CIVL 415, CIVL 554, CIVL 556.

**Typically Offered:** Inquire at department

Earthquake and wind hazard related to the structural design of buildings. Topics include engineering seismology, wind environment and climatology, structural dynamics, structural loading, and design methodologies. Use of computer software for the static and dynamic analysis of three-dimensional building systems. 2 hours activity, 2 hours discussion. (020405)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division

CIVL 561 Hydrology and Open Channels Hydraulics 3 Units
**Prerequisite:** CIVL 461.

**Typically Offered:** Inquire at department

Principles and applications of modern hydrology, precipitation, surface-water runoff, and open channel hydraulics. Includes topics in urban hydrology, stormwater controls and pollution controls. 2 hours activity, 2 hours discussion. (001526)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Sustainable Course; Laptop required

CIVL 561C Hydrology and Open Channel Hydraulics Capstone 3 Units
**Prerequisite:** CIVL 461.

**Corequisites:** CIVL 595W.

**Typically Offered:** Fall and spring

Principles and application of modern hydrology, precipitation, surface-water runoff, and open channel hydraulics. Includes topics in urban hydrology, stormwater controls, and pollution controls. 2 hours activity, 2 hours discussion. (021246)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Sustainable Course; Laptop required

CIVL 562 Groundwater Hydrology 3 Units
**Prerequisite:** CIVL 461.

**Typically Offered:** Inquire at department

An introduction to modern groundwater hydrology emphasizing quantitative analysis of subsurface flow. Topics include well hydraulics, stream/aquifer interactions, and contaminant transport. Use of modeling tools and techniques is emphasized. 2 hours activity, 2 hours discussion. (001498)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Sustainable Course; Laptop required

CIVL 562C Groundwater Hydrology - Capstone 3 Units
**Prerequisite:** CIVL 461.

**Corequisites:** CIVL 595W.

**Typically Offered:** Inquire at department

An introduction to modern groundwater hydrology emphasizing quantitative analysis of subsurface flow. Topics include well hydraulics, stream/aquifer interactions, and contaminant transport. Use of modeling tools and techniques is emphasized. 2 hours activity, 2 hours discussion. (021177)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Sustainable Course

CIVL 564 Spatial Hydrology 3 Units
**Prerequisite:** CIVL 461; ERTH 380 for ERTH majors.

**Typically Offered:** Inquire at department

This course builds on aspects of the rapidly emerging field of spatial hydrology, GIS, and Python introduced during earlier coursework. As spatially explicit remotely sensed and numerically modeled hydrology and climate datasets continue to increase, students need new tools to manage, analyze, and visualize them. This course focuses on applying two core tools already introduced to students in earlier classes (i.e. geographic information systems (GIS) and Python) to a culminating capstone project focused on managing, analyzing, and visualizing how real-world hydrology and climate data sets are changing in space and time. 2 hours activity, 2 hours lecture. (022207)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Laptop required

CIVL 564C Spatial Hydrology - Capstone 3 Units
**Prerequisite:** CIVL 461; ERTH 380 for ERTH majors.

**Corequisites:** CIVL 595W.

**Typically Offered:** Inquire at department

This course builds on aspects of the rapidly emerging field of spatial hydrology, GIS, and Python introduced during earlier coursework. As spatially explicit remotely sensed and numerically modeled hydrology and climate datasets continue to increase, students need new tools to manage, analyze, and visualize them. This course focuses on applying two core tools already introduced to students in earlier classes (i.e. geographic information systems (GIS) and Python) to a culminating capstone project focused on managing, analyzing, and visualizing how real-world hydrology and climate data sets are changing in space and time. 2 hours activity, 2 hours lecture. (022208)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Laptop required

CIVL 567 Pipeline Hydraulics and Design 3 Units
**Prerequisite:** CIVL 302W, CIVL 461.

**Typically Offered:** Inquire at department

Quantitative analysis of pressurized pipelines, pipe networks. The course includes analysis of transients in pipeline systems caused by valve movement, pump power failure, etc; design of transient control devices. 3 hours discussion. (001528)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Laptop required

CIVL 571 Natural Systems for Wastewater Treatment 3 Units
**Prerequisite:** CIVL 431 or faculty permission.

**Typically Offered:** Inquire at department

Natural systems for the treatment of wastewater; transmission of excreta-related infections; treatment systems for removal of pathogens; wastewater and biosolids reuse in agriculture and aquaculture. Special emphasis on the problems of developing countries. 2 hours activity, 2 hours discussion. (001533)

**Grade Basis:** Graded

**Repeatability:** You may take this course for a maximum of 3 units

**Course Attributes:** Upper Division; Sustainable Course
CIVL 571C Natural Systems for Wastewater Treatment - Capstone
Prerequisite: CIVL 431.
Corequisites: CIVL 595W.
Typically Offered: Inquire at department
Course Attributes: Upper Division; Sustainable Course; Laptop required
You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Sustainable Course; Laptop required
You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
3 Units

CIVL 573 Water Quality and Contaminant Transport
Prerequisite: CIVL 231 or CIVL 431.
Typically Offered: Inquire at department
Course Attributes: Upper Division; Sustainable Course; Laptop required
3 Units

CIVL 575 Solid and Hazardous Waste Management
Prerequisite: CIVL 431 or faculty permission.
Typically Offered: Inquire at department
Course Attributes: Upper Division; Sustainable Course
Sustainable Course; Laptop required
3 Units

CIVL 575C Solid and Hazardous Waste Management - Capstone
Prerequisite: CIVL 431 or faculty permission.
Corequisites: CIVL 595W.
Typically Offered: Inquire at department
Course Attributes: Upper Division; Sustainable Course
You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
3 Units

CIVL 586 Advanced Transportation Engineering Design Capstone
Prerequisite: CIVL 441.
Typically Offered: Spring only
3 Units

CIVL 586C Advanced Transportation Engineering Design - Capstone
Prerequisite: CIVL 441.
Corequisites: CIVL 595W.
Typically Offered: Spring only
3 Units

CIVL 595W Capstone Design Project (W)
Prerequisite: GE Oral Communication (A1) requirement, GE Written Communication (A2) requirement; Junior standing.
Corequisites: CIVL 558C, CIVL 561C, CIVL 562C, CIVL 564C, CIVL 571C, CIVL 575C, or CIVL 586C.
Typically Offered: Fall and spring
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment
3 Units W, GW

CIVL 598 Advanced Special Topics
Prerequisite: To be established when courses are formulated.
Typically Offered: Fall and spring
Course Attributes: Upper Division
1-3 Units

CIVL 598C Advanced Special Topics
Prerequisite: To be established when courses are formulated.
Typically Offered: Fall and spring
Course Attributes: Upper Division
You may take this course more than once
3 Units
CIVL 599  Special Problems  1-3 Units
Prerequisite: Faculty permission.
Typically Offered: Inquire at department
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 0 hours supervision. (020171)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division; Laptop required

CIVL 682  Introduction to Pavement Preservation  3 Units
Prerequisite: Bachelor’s Degree or faculty permission.
Typically Offered: Inquire at department
An overview of terms related to pavement management systems and their use in identifying both functional and structural distresses in flexible and rigid pavement and their role in pavement preservation strategies. 3 hours lecture. (020773)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Sustainable Course

CIVL 684  Rigid Pavement Preservation  3 Units
Prerequisite: CIVL 682 or faculty permission.
Typically Offered: Inquire at department
Rigid pavement distress causes and measurements; project selection for preservation methods; construction best practices for preservation, maintenance, and rehabilitation processes. 3 hours lecture. (020775)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division; Sustainable Course

CIVL 697  Independent Study  1-3 Units
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
This course is a graduate-level independent study offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (001551)
Grade Basis: Report in Progress: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

CIVL 698  Special Topics  1-3 Units
Prerequisite: Department permission.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours lecture. (001550)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

CIVL 699T  Master’s Thesis  1-6 Units
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
This course is a master’s study offered as either a Master’s Thesis or a Master’s Project for 1.0-6.0 units. You must register directly with a supervising faculty member. 3 hours supervision. (001555)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

CIVL 699P  Master’s Project  1-6 Units
Prerequisite: Department permission.
Typically Offered: Fall and spring
You must register directly with a supervising faculty member. 3 hours supervision. (001558)
Grade Basis: Report in Progress: CR/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division