

Civil Engineering (CE)

B.S. in Civil Engineering (<http://und-public.courseleaf.com/undergraduateacademicinformation/departmentalcoursesprograms/civilengineering/cive-bs>)

Courses

CE 101. Introduction to Civil Engineering. 1 Credit.

Course will be a series of lectures, discussions and group projects, concerning the practice of civil engineering and sustainable design. Topics include scope of civil engineering practice, professional ethics, professional practice issues, sustainable engineering design concepts, communication skills, project management and team-working, literature searches and information gathering, and career planning. Exposure to Grand Challenges. Prerequisite: CE major or department permission. S/U grading. F.

CE 102. Professional Assessment and Evaluation. 1 Credit.

This course is designed for students with industrial experience. Students complete a portfolio documenting educational and work experiences for evaluation, and individualized curriculum plans are developed. Based on the assessment and evaluation, some civil engineering requirements may be waived. Prerequisites: Work experience and/or technical school training plus completion of CHEM 121, CHEM 121L, PHYS 251, and MATH 265. S/U grading. F,S,SS.

CE 103. Graphical Communication. 3 Credits.

Development of visualization, technical communication, and documentation skills. The course covers 3D AutoCAD geometric modeling using current methods and techniques commonly found in the industry and Civil 3D land systems design program. Fundamentals of land surface modeling and current surveying techniques will be taught in a combined lecture-laboratory format. On-campus students have access to necessary software programs through the CEM computer system. DEDP students are required to download a free computer aided design software version from AUTODESK to their personal computer. Prerequisites: CE major and CE 101 or permission of department.

CE 301. Civil Engineering Laboratory I. 2 Credits.

Course involves lab experiences dealing with design of experiments; determining the properties of coarse and fine aggregates, concrete, asphalt, steel, and wood; and determining the properties of soil in terms of moisture content, specific gravity, grain size distribution, index properties, moisture-density relationships, and permeability. Students perform lab work in teams and write reports as a group and/or individually. Prerequisites: CE major, ENGR 203, and ENGL 110. Corequisites: MATH 321 and CE 412. F,SS.

CE 302. Civil Engineering Laboratory II. 2 Credits.

Course involves lab experiences dealing with design of experiments; fluid properties, flow measurements, open channel flow, pipe flow, and hydraulic machinery; and water and wastewater treatment topics such as BOD, total and suspended solids, water hardness, chlorination, alkalinity, coagulation, and jar testing. Students perform lab work in teams and communicate results in written reports and one oral presentation. Prerequisites: CE major, ENGR 203, and ENGL 110. Corequisites: MATH 321, CE 431, and CE 423. S,SS.

CE 306. Fluid Mechanics. 3 Credits.

Fluid properties; fluid statics and dynamics; transport theory and transport analogies, conservation of mass, energy, and momentum; dimensional analysis; boundary layer concepts; pipe flows; compressible flow; open channel flow. Prerequisites: PHYS 251 and MATH 265. F,S.

CE 313. General Surveying. 2 Credits.

Measurements of distances and angles, EDM, satellite and inertial systems, triangulation, differential leveling, horizontal curves, vertical curves, traverse surveys, U.S. public land surveys, earthwork, boundary surveys and construction surveys. Basic knowledge of geometry and trigonometry required. Prerequisites: MATH 165 and CE 101 or permission of the department. Corequisite: On campus students must take CE 313L along with this class. F.

CE 313L. General Surveying Laboratory. 1 Credit.

Course will involve laboratory assignments dealing with measurements of distances and angles; use of EDM, GPS, and automatic levels; traversing; leveling; horizontal curves; vertical curves; and topographic survey. Offered in Summer for DEDP students. Prerequisite: DEDP students must have completed CE 313. Corequisite: On-campus students must be enrolled in CE 313. F.

CE 351. Structural Mechanics. 4 Credits.

Reactions, shear and bending moment, plane and space trusses, influence lines, deflections, virtual work, energy methods, approximate analysis, consistent deformations method, slope deflection and moment distribution methods, introduction to matrix methods. Use of computer for analysis. Prerequisite: ENGR 203. F.

CE 397. Cooperative Education. 1-8 Credits.

A practical work experience with an employer closely associated with the student's academic area. Arranged by mutual agreement among student, department and employer. Repeatable to 24 credits. Prerequisite: Admission to the civil engineering program or consent of advisor. Repeatable to 24 credits. F,S,SS.

CE 412. Soil Mechanics. 3 Credits.

Course topics include principles of soil mechanics including weight-volume relationships, classification, compaction, effective stress, permeability and seepage, consolidation, shear strength, site exploration, introduction to lateral earth pressure, and slope stability. Prerequisite: ENGR 203. F.

CE 414. Foundation Engineering. 3 Credits.

Soil improvements and ground modifications, soil exploration and sampling, bearing capacity, spread footings, mat foundations, settlement analysis, drilled shaft and pile foundations, foundations on difficult soil. Prerequisite: CE 412. S.

CE 416. Transportation Engineering. 3 Credits.

Introduction to highway engineering, traffic analysis, and transportation systems; road vehicle performance; highway, vehicle, and driver characteristics; highway capacity and level of service analysis; level of service analysis for signalized intersections; principles of traffic flow; geometric design of highways; pavement design and drainage; highway safety and transportation planning; and group design project. Prerequisite: CE 412. S.

CE 421. Hydrology. 3 Credits.

Course topics include measurement, interpretation, analysis and application of hydrologic data; precipitation, evaporation and transpiration; runoff hydrographs; routing methods; groundwater; and snow hydrology. Computer applications. Prerequisite: CE 306. F.

CE 423. Hydraulic Engineering. 3 Credits.

Fluid statics and dynamics; open channel flow; transitions and controls; hydraulic structures; hydraulic machinery; hydraulic power conversion; and hydraulic modeling. Prerequisite: CE 306. S.

CE 431. Environmental Engineering I. 3 Credits.

Environmental quality, water quality modeling, water wastewater treatment systems, sludge processing, solid wastes, hazardous wastes, environmental law. Prerequisite: CE 306. S.

CE 432. Environmental Engineering II. 3 Credits.

Water distribution networks, mass curve analysis, wastewater collection systems, pumping systems for water and wastewater, system design project, computer-assisted design, confined spaces. Prerequisite: CE 306. F.

CE 434. Environmental Engineering Laboratory. 4 Credits.

Physical, chemical and biological methods used in environmental engineering, water chemistry, instrumental methods, lab tours. On demand.

CE 435. Hazardous Waste Management. 3 Credits.

Regulations, generation, storage, transportation, disposal, classification, fate and transport of contaminants, environmental audits, pollution prevention and management facilities, remediation alternatives, physical-chemical treatment, bioremediation, stabilization/solidification, thermal processes. Prerequisites: CE 306 and CHEM 121. S.

CE 444. Contracts and Specifications. 3 Credits.

Engineering contracts and specification essentials, legal aspects of engineering practice and employment; professional practice issues; procurement of work; governmental regulation. S.

CE 451. Steel Design. 3 Credits.

Selection of sections, bolted and welded connections, trusses, bearings, lightgauge structural members, fatigue of structural members and introduction to plastic design. Prerequisite: CE 351. S.

CE 453. Reinforced Concrete. 3 Credits.

Material properties of reinforced concrete ingredients; mix design of ordinary and high performance concrete; loads and load factors; introduction to the working stress method in reinforced concrete; analysis and strength design of reinforced concrete beams in bending, shear, and development length; design of one way slabs; serviceability requirements for deflection and cracking; axially and eccentrically loaded reinforced concrete columns. The design process is based on ACI 318 building code. Prerequisite: CE major and CE 351. F.

CE 482. Civil Engineering Design I. 3 Credits.

This is a comprehensive design course which integrates engineering design and engineering science components of previous and ongoing coursework into a major design experience. Design projects can be in the areas of environmental, geotechnical, structures, water resources, or transportation engineering. Course activities include defining the problem, formulating project objectives, gathering background information, scheduling the project, applying design standards and realistic constraints; developing design alternatives; and evaluating design alternatives. Other topics covered include project management, effective team-working, professional ethics, and applications of graphical communication. Group design reports and individual oral presentations are required. Prerequisites: Two of these four: CE 451, CE 412, CE 423 and CE 431. F.

CE 483. Civil Engineering Design II. 3 Credits.

This is a comprehensive design course which integrates engineering design and engineering science components of previous and ongoing coursework into a major design experience. Design projects can be in the area of environmental, geotechnical, structural, water resources, or transportation engineering. Course activities include developing and analyzing a detailed design, preparing plans and drawings using graphical communication tool(s), developing design specifications, and estimating construction costs. Other topics include principles of sustainability in design, and professional licensure and professional practice issues. Group design reports and individual oral presentations are required. Prerequisites: CE 482 or departmental consent. S.

CE 490. Special Topics. 1-3 Credits.

Investigation of special topics dictated by student and faculty interests. Repeatable. Prerequisite: Department approval. Repeatable. F,S.