



BS in CIVIL ENGINEERING (392850) MAP Sheet
 Department of Civil and Environmental Engineering
 For students entering the degree program during the 2016–2017 curricular year.

UNIVERSITY CORE AND GRADUATION REQUIREMENTS				PROGRAM REQUIREMENTS (95–96 total hours)			
UNIVERSITY CORE REQUIREMENTS				Complete the following courses:			
<u>Requirements</u>	<u># Classes</u>	<u>Hours</u>	<u>Classes</u>	CE En 101 Intro to Civil Engineering	1.0	Math 112* Calculus 1	4.0
Religion Cornerstones				CE En 103 Engineering Mechanics—Statics	3.0	Math 113* Calculus 2	4.0
Teachings and Doctrine, Book of Mormon	1	2.0	Rel A 275	CE En 112 Engineering Drafting w/CAD Applications	3.0	Phscs 123 Principles of Physics 2	3.0
Jesus Christ & the Everlasting Gospel	1	2.0	Rel A 250	CE En 114 Geomatics	2.0	Stat 201* Statistics for Engineers & Scientists	3.0
Foundations of the Restoration	1	2.0	Rel C 225	CE En 200A Civil & Environmental Engineering Seminar	0.5	Complete one of the following culminating design courses (technical elective):	
The Eternal Family	1	2.0	Rel C 200	CE En 200B Civil & Environmental Engineering Seminar	0.5	CE En 427 International Megastructures	3.0
The Individual and Society				CE En 201 Sustainable Infrastructure	2.0	CE En 439 Water Resources Study Abroad	3.0
Citizenship				CE En 203 Engr Mechanics— Mechanics of Materials	3.0	CE En 472 Civil Engineering Design	3.0
American Heritage	1–2	3–6.0	from approved list	CE En 204* Engineering Mechanics—Dynamics	3.0	Complete 4 additional technical elective courses from the following (note: a course taken as a major requirement course may not double count as a technical elective course):	
Global & Cultural Awareness	1	3.0	Eng T 231*	CE En 270 Computational Methods	3.0	CE En 414 Engineering Applications of GIS	3.0
Skills				CE En 300A Civil & Environmental Engineering Seminar	0.5	CE En 421 Structural Steel Design	3.0
Effective Communication				CE En 300B Civil & Environmental Engineering Seminar	0.5	CE En 424 Reinforced Concrete Design	3.0
First-Year Writing	1	3.0	from approved list	CE En 304 CE Materials: Metals, Woods, Composites	1.5	CE En 427 International Megastructures	3.0
Adv Written & Oral Communication	1	3.0	Engl 316*	CE En 306 CE Materials: Concrete, Masonry, Asphalt	1.5	CE En 431 Hydrology	3.0
Quantitative Reasoning	0–1	0–4.0	Math 112*, 113* or Stat 201*	CE En 321 Structural Analysis	3.0	CE En 433 Hydraulic Engineering	3.0
Languages of Learning (Math or Language)	1	4.0	Math 112*, 113* or Stat 201*	CE En 332 Hydraulics and Fluid Flow Theory	3.0	CE En 439 Water Resources Study Abroad	3.0
Arts, Letters, and Sciences				CE En 341 Elementary Soil Mechanics	3.0	CE En 442 Foundation Engineering	3.0
Civilization 1 and 2	2	6.0	from approved list	CE En 361 Introduction to Transportation Engineering	3.0	CE En 461 Geometric Design of Highways	3.0
Arts	1	3.0	from approved list	CE En 400A Civil & Environmental Engineering Seminar	0.5	CE En 467 International Megacities	3.0
Letters	1	3.0	from approved list	CE En 400B Civil & Environmental Engineering Seminar	0.5	CE En 472 Civil Engineering Design	3.0
Scientific Principles & Reasoning				Note: Students must be enrolled in seminar each Fall/Winter semester from the time the major is declared until graduation, beginning with 100A/B and continuing through 400A/B. Transfer students, or students joining the major from another department, should start with 100 A/B and then see the Dept. Undergraduate Advisor for future placement.			
Biological Science	1	3.0	from approved list	Complete one course from the following:			
Physical Science	1	3.0	CE En 204*	CE En 471A Civil Engineering Practice	1.0	CE En 500 Design and Materials Applications	3.0
Social Science	1	3.0	Eng T 231*	CE En 471B Civil Engineering Practice	1.0	CE En 501 Stress Analysis & Design of Mechanical Structures	3.0
Core Enrichment: Electives				Complete one of the following options:			
Religion Electives	3–4	6.0	from approved list	Either			
Open Electives	Variable	Variable	personal choice	Math 302 Mathematics for Engineering 1	4.0	CE En 503 Plasticity and Fracture	3.0
GRADUATION REQUIREMENTS:				Math 303 Mathematics for Engineering 2	4.0	CE En 504 Computer Structural Analysis and Optimization	3.0
Minimum residence hours required		30.0		Or			
Minimum hours needed to graduate		120.0		Math 313 Elementary Linear Algebra	3.0	CE En 505 Portland Cement Concrete Mixture Design and Analysis	3.0
				Math 314 Calculus of Several Variables	3.0	CE En 507 Linear Finite Element Methods	3.0
				Math 334 Ordinary Differential Equations	3.0	CE En 508 Structural Vibrations	3.0
				Complete the following supporting courses:			
				Chem 105 General College Chemistry	4.0	CE En 514 Geospatial Software Development	3.0
				Engl 316* Technical Communication	3.0	CE En 521 Seismic-Resistant Steel Buildings	3.0
				Eng T 231* Foundations of Global Leadership	3.0	CE En 523 Aircraft Structures	3.0
				Geol 330 Geology of Engineers	3.0	CE En 525 Bridge Structures	3.0
						CE En 528 Masonry Design	3.0
						CE En 529 Timber Design	3.0
						CE En 531 Principles of Hydrologic Modeling	3.0
						CE En 534 Hydroinformatics	3.0
						CE En 535 Hydraulic Design of Channels & Control Structures	3.0

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CE En 540	Geo-Environmental Engineering	3.0
CE En 544	Seepage & Slope Stability Analysis	3.0
CE En 545	Geotechnical Analysis of Earthquake Phenomena	3.0
CE En 547	Groundwater Modeling	3.0
CE En 551	Water Treatment Facilities Design	3.0
CE En 555	Environmental Chemistry	3.0
CE En 562	Traffic Engineering: Characteristics & Operations	3.0
CE En 563	Pavement Design	3.0
CE En 565	Urban Transportation Planning	3.0
CE En 570	Computer-Aided Engr Software Development	3.0
CE En 572	Computer-Aided Geometric Design	3.0
CE En 575	Optimization Techniques in Engineering	3.0
CE En 594R	Selected Prob. in Civil & Environmental Engineering	3.0V

Note: 1 of the 4 additional technical elective courses may come from:
Eng T 497R Global Engineering Outreach Projects
Me En 321 Thermodynamics

Complete 2 of the following 4 basic design options:

Option 1:		
CE En 421	Structural Steel Design	3.0
or		
CE En 424	Reinforced Concrete Design	3.0
Option 2:		
CE En 431	Hydrology	3.0
or		
CE En 433	Hydraulic Engineering	3.0
Option 3:		
CE En 442	Foundation Engineering	3.0
Option 4:		
CE En 461	Geometric Design of Highways	3.0

Note: Basic design electives must be from 2 different options.

Suggested Sequence of Courses:

FRESHMAN YEAR

<u>1st Semester</u>	
First-Year Writing or A Htg	3.0
Bio 100	3.0
CE En 101 (FW)	1.0
CE En 112 (FW)	3.0
Math 112 (FWSpSu)	4.0
Religion Cornerstone course	2.0
Total Hours	16.0

<u>2nd Semester</u>	
First-Year Writing or A Htg	3.0
CE En 114 (FW)	2.0
CE En 103 (FWSp)	3.0
Eng T 231 (FW)	3.0
Math 113 (FWSpSu)	4.0
Religion Cornerstone course	2.0
Total Hours	17.0

SOPHOMORE YEAR

<u>3rd Semester</u>	
CE En 201 (FW)	2.0
CE En 200A (F)	0.5
CE En 203 (FWSu)	3.0
Chem 105 (FWSpSu)	4.0
Math 302 (FWSpSu)	4.0
Religion Cornerstone course	2.0
Total Hours	15.5

<u>4th Semester</u>	
CE En 200B (W)	0.5
CE En 204 (FWSu)	3.0
CE En 270 (FW)	3.0
Religion elective	2.0
Math 303 (FWSu)	4.0
Stat 201	3.0
Total Hours	15.5

JUNIOR YEAR

<u>5th Semester</u>	
CE En 300A (F)	0.5
CE En 321 (FSp)	3.0
CE En 332 (FW)	3.0
CE En 361 (FSp)	3.0
Engl 316	3.0
Religion Cornerstone course	2.0
Total Hours	14.5

<u>6th Semester</u>	
CE En 300B (W)	0.5
CE En 304 (FW)	1.5
CE En 306	1.5
CE En 341 (FW)	3.0
Geol 330 (FW)	3.0
Letters elective	3.0
Religion elective	2.0
Religion elective (Rel C 351 recomm.)	2.0
Total Hours	16.5

SENIOR YEAR

<u>7th Semester</u>	
CE En 400A (FW)	0.5
Basic design elective	3.0
CE En 471 (FW)	1.0
Civilization 1 elective	3.0
Phscs 123	3.0
Technical elective	3.0
Technical elective	3.0
Total Hours	16.5

<u>8th Semester</u>	
CE En 400B (FW)	0.5
Basic design elective	3.0
Civilization 2/Arts elective	3.0
Technical elective	3.0
Technical elective	3.0
Culminating design elective	3.0
Total Hours	15.5

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Note: Students are encouraged to complete an average of 16 credit hours each semester or 32 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the cost and the number of semesters to graduate.

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THE DISCIPLINE

The BYU Department of Civil and Environmental Engineering prepares students for professional involvement in structural, water resources, environmental, geotechnical (soils), and transportation engineering.

Structural engineers analyze and design buildings, bridges, and other structures. The engineer applies principles of physics, mathematics, and engineering to develop efficient yet safe designs. Sophisticated computer models are used in these analyses. Materials used by structural engineers include steel, aluminum, concrete, masonry, wood, and composites.

Water resource and environmental engineers design pipeline systems, water treatment plants, dams, flood control structures, waste disposal sites, and environmental restoration projects. Computer modeling and analyses are used in design and to forecast storm runoff, flooding, and movement of contaminants in surface and subsurface waters. Environmental engineers evaluate and reduce pollutants from natural, human, agricultural, and industrial sources to preserve the beauty and quality of air, land, and water.

Geotechnical engineers design structures composed of or located within earth materials, including foundations for buildings and bridges, retaining walls, earth dams, highway embankments, tunnels, and liners for landfills. Field and laboratory tests on soil and rock along with empirical and computer models are used to assure safety and economy in design.

Traffic and transportation engineers apply scientific principles to the planning, design, construction, operation, and management of transportation systems, including highways, railroads, airports, and mass transit facilities. Transportation engineers are responsible for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods. Computer models and simulations are used by traffic engineers for geometric design and for planning, operating, and managing transportation networks, including intermodal systems.

STUDENT CHAPTER

The BYU Department of Civil and Environmental Engineering Student Chapter of the American Society of Civil Engineers is one of the nation's most active and successful chapters. The Chapter has received the Ridgway Award as the nation's top chapter 6 times. Through participation in the chapter, students have an opportunity to learn about the broad spectrum of civil engineering opportunities. They may also participate in chapter community service projects, which include the construction of bridges, parks, and other aids to communities in the area.

Besides the well-established BYU ASCE Student Chapter, the department has two transportation-focused student chapters: The BYU Institute of Transportation Engineers (ITE) Student Chapter and the BYU American Railway Engineering and Maintenance-of-Way Association (AREMA) Student Chapter. Through the activities of these two chapters, students are able to meet with professional engineers and their potential future employers in their monthly meetings, associate with students who have the same career goals, learn from invited speakers and have opportunities to do service projects in the community.

FINANCIAL ASSISTANCE

In addition to university scholarships, the department awards many part-tuition scholarships, largely to upper division and graduate students. To apply, visit ceen.et.byu.edu/content/scholarships.

Many teaching and research assistantships are available in the department, largely for upper-division and graduate students.

CAREERS

Civil engineers are employed in industry, private consulting, and government. Industries employing many civil and environmental engineers include construction, transportation, aerospace, petroleum, and mining. Many civil engineers enter private consulting practices, and many eventually establish their own firms.

Civil engineers are also employed by national, state, and local governments. Most cities and counties have engineering departments staffed largely by civil engineers. Departments of transportation, environmental protection agencies, the Army Corps of Engineers, and the Bureau of Reclamation hire many civil engineers.

Civil engineering may be used as a preprofessional program for careers in architecture, law, and business.

PROFESSIONAL ENGINEERING REGISTRATION

Because civil engineers design structures that affect public health and safety, licensure as a Professional Engineer is required for most positions. A necessary prerequisite for licensure is graduation from an accredited engineering program. The BYU Civil Engineering program is currently accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org/>.

During the senior year, students are encouraged to take the Fundamentals of Engineering Exam. This exam is the first step in registration as a Professional Engineer, a mark of competence and professional stature.

MAIN SUBDISCIPLINE AREAS

Structures: Includes structural design of buildings and bridges, seismic design of structures, fiber-reinforced polymer composite structures, aircraft structures, structural optimization, and numerical methods for structural analysis.

Water resources and environmental: Includes industrial and hazardous waste control, hazardous waste site remediation, water and wastewater treatment, water quality management, computer-base analyses and design of water and wastewater systems, satellite hydrology, hydroinformatics, and hydraulic structures and systems.

Geotechnical : Includes soils as engineered systems, foundation and embankments, ground response to earthquakes, liquefaction, collapsible soils, and soil improvement techniques.

Transportation: Includes transportation systems and planning, geometric highway design, traffic operations and safety, highway materials, and pavement design.