

# Civil Engineering

(A Division of the Mechanical Engineering Department)



Greg Roach, Department Chair  
Bill Cooley, Russell Daines, Nathan Harris, David Johnson, Jim Lawrence, Garth Miller

Kenna Carter, Department Secretary (208) 496-7630  
<http://www.byui.edu/MechEngr/>

## Civil Engineering

The program of Civil Engineering has one engineering program:

- 4-Year Bachelor of Science in Civil Engineering, BSCE (465)

The Bachelor of Science degree program in Civil Engineering has been developed in accordance with ABET standards. The Civil Engineering program will apply for formal ABET accreditation at the earliest possible time in conjunction with ABET accreditation requirements. Accreditation is anticipated to be granted retroactively to the first graduating class.

Using techniques, skills, and modern engineering modeling tools, students must demonstrate their abilities to apply mathematics, engineering science, and technology principles necessary for analyzing, modeling, and solving engineering problems. Students must communicate effectively in written and oral presentation. Each student must gain an understanding of professional and ethical behavior in the workplace. Finally, students should understand that learning is a life-long process and develop a desire to continue to enhance their abilities as a professional engineer.

The Civil Engineering program prepares students for professional careers in a wide range of areas including structures, water resources, environmental, transportation and geotechnical engineering. Civil engineers are involved in a variety of activities such as the design and analysis of buildings, bridges, air frames, highways, airports, pipeline systems, dams, flood control structures, and waste water treatment plants.

The 4-year Bachelor of Science program in Civil Engineering (BSCE - 465) provides students with a solid foundation in mathematics, engineering science, solid mechanics, structural, geotechnical, transportation and water resources engineering. In addition, students choose a focus area in computer aided engineering, systems design, engineering management, engineering mechanics, environmental/water resources, construction, geotechnical, material science, mining/petroleum, pre-medical, or general engineering.

Students in the BSCE program are required to take the Fundamentals of Engineering (FE) exam before they graduate. This is an important milestone of achievement for each civil engineering student in preparing him/her for future licensing as a Professional Engineer. Students will also be required to pass a competency exam in order to register for any 300 and 400 level courses.

This program is designed to provide students with the competencies necessary to work in a variety of exciting fields within Civil Engineering. This program offers excellent placement potential, professional job satisfaction, and substantial salaries. Students entering this program can expect a well-designed and rigorous curriculum based on industry standards.

The bachelor of science program in Civil Engineering (465) is available to students entering Brigham Young University-Idaho on any admission track.

## Program Educational Objectives

Program Educational Objectives for the baccalaureate degree in Civil Engineering are to produce engineering graduates who:

1. Demonstrate and maintain faith in God, and exhibit high standards of personal integrity and professional ethics through lifelong service to family, church, profession, and community. [Service]
2. Provide leadership in their chosen field of endeavor through the application of effective interpersonal, communication, and teamwork skills. [Leadership]
3. Apply fundamental principles of design and analysis to develop innovative solutions in an industrial and societal context. [Design]
4. Maintain currency in their field through continued learning and education. [Lifelong Learning]

## Student Outcomes

To achieve the educational objectives, the following outcomes will be measured during the course of study within the BSCE program. Assessment methods consistent with accreditation recommendations will be used to determine how each student meets these outcomes.

The Civil Engineering program at BYU-Idaho is designed to give students the ability to:

1. Apply knowledge of fundamental math, science, and engineering principles. (Fundamentals)
2. Design and conduct experiments and analyze the resulting data. (Experiments)
3. Design components, systems, or processes necessary to meet product specifications and design constraints. (Engineering Design)
4. Function well within a multidisciplinary team. (Team Work)
5. Identify, formulate, and solve engineering problems. (Model & Solve)
6. Maintain high ethical, moral, and professional standards. (Ethics)
7. Communicate effectively in both oral and written format. (Communication)
8. Understand the impact engineering has on the world. (Global Impact)
9. Recognize the need for, and engage in life-long learning. (Continued Learning)
10. Understand contemporary issues. (Contemporary Issues)
11. Use the techniques, skills, and modern engineering tools necessary for engineering practice. (Engineering Tools)

**Civil Engineering**  
**Brigham Young University-Idaho 2014-2015**

- Apply knowledge in environmental, geotechnical, structural, transportation, and water resources engineering. (Technical Breadth)
- Explain basic concepts in management, business, public policy, leadership, and the importance of professional licensure. (Professional Breadth)

the civil engineering program is Calculus (FDMAT 112). Entering freshman students should consult with their advisor to ensure they are beginning with the mathematics course for which they are prepared. Students with weak mathematics skills are advised to enroll in a preparatory mathematics course to strengthen their skills.

**General Information**

Mathematics and physical sciences are critical components of any engineering curriculum. The normal entry-level mathematics class for

It is imperative that students develop and follow a plan of study that will allow them to complete all the required courses within the credit hour limits. Students should consult with their advisor/mentor early to make sure their educational plan is correct. Sample curriculum flow charts can be found at <http://www2.byui.edu/MechEngr/>

<b>BS in Civil Engineering (465)</b>				
Take required Foundations courses**				
Major Requirements				
<i>No Double Counting of Major Courses - Students must maintain a minimum grade of C- in their major courses</i>				
<b>Entry Courses</b> <i>Take these courses your first 2 semesters:</i>	<i>Choose a 12 credit emphasis from the following list</i>			
CHEM 105           4	<b>Computer Aided Engineering</b>	<b>*Environmental/Water Resources</b>	<b>*Mining Engineering</b>	<b>Transportation</b>
ME 101               1	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take these courses:</i>	<i>Take this course:</i>
ME 142               3	ME 342               3	GEOL 111           3	GEOL 111           3	CE 461
ME 172               3	ME 425               3	GEOL 111L        1	GEOL 111L        1	<i>Take 9 credits:</i>
11	ME 438               3	CE 370               3	GEOL 140           1	GEOL 340           3
<b>Core Courses</b>	ME 460               3	<i>Take 5 credits:</i>	GEOL 351           3	CONST 330           3
<i>Take these courses:</i>	<b>*Construction</b>	ARCH 300           3	GEOL 352           3	MATH 423           3
CE 321               3	<i>Take 12 credits:</i>	GEOL 140           1	ME 465               3	POLSC 330           3
CE 341               3	ARCH 300           3	GEOL 340           3	CE 441               3	<b>General</b>
CE 351               3	ARCH 120           3	GEOL 404           3	<b>*Petroleum Engineering</b>	<i>Take 12 credits:</i>
CE 361               3	CONST 320          2	GEOL 435           3	<i>Take these courses:</i>	CE 370               3
CE 424               3	CONST 330          3	<b>*Geotechnical</b>	GEOL 111           3	CE 421               3
CE 433               3	CONST 380          3	<i>Take this course:</i>	GEOL 111L        1	CE 441               3
CE 470               3	CONST 420          3	CE 441               3	<i>Take 8 credits:</i>	CE 461               3
CONST 340          3	<b>Engineering Management</b>	<i>Take 9 credits:</i>	CE 441               3	CIT 380              3
MATH 215           4	<i>Take these courses:</i>	GEOL 111           3	GEOL 140           1	GEOL 340           3
MATH 316           4	B 101                3	GEOL 111L        1	GEOL 340           3	ME 337               3
MATH 330           3	B 301               3	GEOL 140           1	GEOL 370           4	ME 342               3
ME 201               2	B 321               3	GEOL 340           3	GEOL 404           3	ME 370               3
ME 202               3	<i>Take 3 credits:</i>	GEOL 351           3	GEOL 425           3	ME 410               3
ME 204               3	B 361               3	GEOL 404           3	GEOL 435           3	ME 425               3
ME 250               3	B 383               3	<b>Material Science</b>	ME 465               3	ME 438               3
ME 250L            1	CIT 380              3	<i>Take 12 credits:</i>	<b>Structural</b>	ME 445               3
ME 360               3	<b>Engineering Mechanics</b>	CHEM 106           4	<i>Take these courses:</i>	ME 460               3
PH 123               3	<i>Take this course:</i>	CHEM 220           5	CE 421               3	ME 495R             3
53	ME 425               3	CHEM 351           4	ME 460               3	<i>Take 6 credits:</i>
<b>Take 1 option:</b>	<i>Take 9 credits:</i>	CHEM 352           4	CE 441               3	CE 441               3
GEOL 111           3	ME 337               3	CHEM 461           3	MATH 411           3	MATH 411           3
GEOL 111L          1	ME 370               3	CHEM 462           3	ME 342               3	ME 342               3
or	ME 445               3	PH 220               3	ME 445               3	ME 445               3
BIO 221              3	ME 460               3			
3				
<b>Experiential Learning</b>				
<i>Take 1 credit:</i>				
ME 299               1				
ME 398R             1				
ME 490R             1				
1				
<b>Program Notes:</b>				
<b>COMPETENCY EXAM</b> Students must complete the Mechanical Engineering Competency Exam.				
<b>FE EXAM</b> Students must take the FE Exam prior to graduation.				
*Per discussion with applicable departments, ME core satisfies other imbedded prerequisites.				
**See list of specific Foundations courses for Civil Engineering in this section of the catalog.				
<b>Total Major Credits=80</b>				
This major is available on the following tracks:				
Fall-Winter---- YES	Winter-Spring---- YES	Spring-Fall---- YES		

## Foundation Requirements for BS in Civil Engineering

### Major Requirements

*Students must maintain a minimum grade of C- in their major courses*

Academic Fundamentals	Science	Cultural Awareness	Eternal Truths	
<b>Quantitative Reasoning</b> <i>Take these courses:</i> FDMAT 112           4 FDMAT 108T        1 5	<b>Science Foundations</b> <i>Take this course:</i> FDSCI 101           2 2	<b>American Foundations</b> <i>Take this course:</i> FDAMF               3 3	<b>Family Foundations</b> <i>Take this course:</i> FDREL 200           2 2	<b>Other Religion Courses</b> <i>Take 4 credits:</i> FDREL 100           2 FDREL 130           2 FDREL 150           2 FDREL 190           1-3 FDREL 215           2 FDREL 234           2 FDREL 235           2 FDREL 261           2 FDREL 333           2 FDREL 341           2 FDREL 342           3 FDREL 343           3 FDREL 351           2 FDREL 352           2 FDREL 431           2 FDREL 471           2 FDREL 475           2 4
<b>Reading and Writing</b> <i>Take these courses:</i> FDENG 101           3 FDENG 201           3 6	<b>Science Issues</b> <i>Take this course:</i> PH 121               3 3	<b>Choose 1 option</b>  <b>Humanities Foundations</b> <i>Take this course:</i> FDCA 101            3 3  <b>AND</b> <b>International Foundations</b> <i>Take 1 course:</i> FDCA 201            2 FDCA 202            2 FDCA 203            2 FDCA 204            2 FDCA 205            2 FDCA 206            2 2	<b>Book of Mormon</b> <i>Take these courses:</i> FDREL 121           2 FDREL 122           2 4  <b>Scripture Based Courses</b> <i>Take 4 credits:</i> FDREL 211           2 FDREL 212           2 FDREL 301           2 FDREL 302           2 FDREL 324           2 FDREL 325           2 FDREL 327           2 FDREL 404           2 4	
		<b>Connections</b> <i>Take this course:</i> FDCNC 350          2 2		

**Total Foundation Credits for Civil Engineering=40**

### Course Descriptions

### Credits\*

#### CE 321 Structural Analysis

**(3:3:0)**

Prerequisites: ME 142 and ME 202  
Co-requisite: MATH 316

Deflection analysis by the method of virtual work. Analysis of statically indeterminate structures by the flexibility method, the stiffness method, and moment distribution.

Computer analysis of structures.

(Fall)

#### CE 341 Elementary Soil Mechanics

**(3:2:2)**

Prerequisite: ME 202

Determination of stresses in soils, soil strength, consolidation, and settlement. Applications in fluid flow, lateral earth pressure, bearing pressure, and slope stability.

(Winter)

#### CE 351 Environmental Engineering

**(3:3:0)**

Prerequisites: CHEM 105 and MATH 330

Environmental concerns, problems, and evaluation methodology; pollution control, and engineering management approaches.

(Winter)

#### CE 361 Introduction to Transport Engineering

**(3:3:2)**

Prerequisites: ME 142, ME 172, MATH 330, and CONST 340

Transportation system characteristics, traffic engineering, traffic operations, transportation planning, highway geometric design, pavement design, highway safety, public transport.

(Fall)

#### CE 370 Hydrology

**(3:2:2)**

Prerequisites: MATH 330 and ME 360

Explores the principles and processes governing the movement of water through the hydrologic cycle. Hydrologic statistics and frequency analysis techniques supplemented with current software will be applied to problems of engineering hydrologic design.

(Fall)

#### CE 421 Structural Steel Design

**(3:3:0)**

Prerequisites: ME 250, CE 321, and CE 341

Compression and tension of steel members, beams, and beam-columns. Elastic and inelastic lateral-torsional buckling. Structural fasteners. Emphasizes LFRD. Consideration of seismic conditions.

(Winter)

#### CE 424 Reinforced Concrete Design

**(3:3:0)**

Prerequisites: ME 250, CE 321, and CE 341

Theory and design of reinforced concrete, including columns, beams, slabs, and footings; elastic and ultimate-strength methods of analysis.

(Fall)

#### CE 433 Hydraulic Engineering

**(3:3:0)**

Prerequisites: ME 360 and CE 351

Application of fluid mechanics principles to analysis and design of hydraulic structures and systems.

(Fall)

#### CE 441 Geotechnical Engineering Design

**(3:3:0)**

Prerequisite: CE 341

Application of principles and theories learned in soil mechanics. Evaluation of slope stability. Design consideration for various foundations, including shallow foundations, piles, drilled-shafts, and retaining walls.

(Fall)

#### CE 461 Geometric Design of Highways

**(3:2:2)**

Prerequisite: CE 361

Design of highway systems including classification, design criteria and controls, horizontal and vertical alignment, cross-sections, clear zone, signing and striping, and capacity.

(Winter)

#### CE 470 Civil Engineering Practice and Design

**(3:2:2)**

Prerequisites: CE 424 and CE 433

Engineering economic analysis, professional practice issues, and experience in completion of a civil engineering design project by applying appropriate engineering standards and multiple realistic constraints.

(Winter)