

# Civil Engineering

(A Division of the Mechanical Engineering Department)



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<http://www.byui.edu/mechanical-engineering>

## 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.

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 who continue to develop a desire to enhance their abilities as a professional engineer and understand that learning is a life-long process, will be able to succeed in their careers.

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, engineering mechanics, environmental/water resources, geotechnical, material science, mining/petroleum, structural, transportation, 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 in mechanical engineering and civil engineering.

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. Upper division courses require students to switch to the Fall/Winter 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)
12. Apply knowledge in environmental, geotechnical, structural, transportation, and water resources engineering. (Technical Breadth)
13. Explain basic concepts in management, business, public policy, leadership, and the importance of professional licensure. (Professional Breadth)

**General Information**

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

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>																																																																																																																																																																																																																																																							
<p><b>Entry Courses</b> <i>Take these courses your first 2 semesters:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CHEM 105</td><td style="text-align: right;">4</td></tr> <tr><td>ME 101</td><td style="text-align: right;">1</td></tr> <tr><td>ME 142</td><td style="text-align: right;">3</td></tr> <tr><td>ME 172</td><td style="text-align: right;">3</td></tr> <tr><td style="border-top: 1px solid black;"></td><td style="text-align: right; border-top: 1px solid black;">11</td></tr> </table> <p><b>Core Courses</b> <i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CE 321</td><td style="text-align: right;">3</td></tr> <tr><td>CE 341</td><td style="text-align: right;">3</td></tr> <tr><td>CE 351</td><td style="text-align: right;">3</td></tr> <tr><td>CE 361</td><td style="text-align: right;">3</td></tr> <tr><td>CE 424</td><td style="text-align: right;">3</td></tr> <tr><td>CE 433</td><td style="text-align: right;">3</td></tr> <tr><td>CE 470</td><td style="text-align: right;">3</td></tr> <tr><td>CONST 340</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 215</td><td style="text-align: right;">4</td></tr> <tr><td>MATH 316</td><td style="text-align: right;">4</td></tr> <tr><td>MATH 330</td><td style="text-align: right;">3</td></tr> <tr><td>ME 201</td><td style="text-align: right;">2</td></tr> <tr><td>ME 202</td><td style="text-align: right;">3</td></tr> <tr><td>ME 204</td><td style="text-align: right;">3</td></tr> <tr><td>ME 250</td><td style="text-align: right;">3</td></tr> <tr><td>ME 250L</td><td style="text-align: right;">1</td></tr> <tr><td>ME 360</td><td style="text-align: right;">3</td></tr> <tr><td>PH 123</td><td style="text-align: right;">3</td></tr> <tr><td style="border-top: 1px solid black;"></td><td style="text-align: right; 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background-color: #e0e0e0;"><b>Credit Requirements:</b></td> <td colspan="2" style="text-align: center; background-color: #e0e0e0;"><b>Tracks Available:</b></td> </tr> <tr> <td style="width: 20%;">Foundations</td> <td style="width: 20%; text-align: right;">40</td> <td style="width: 20%;">Fall-Winter</td> <td style="width: 20%; text-align: center;">Yes</td> </tr> <tr> <td>Major</td> <td style="text-align: right;">80</td> <td>Winter-Spring</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Total</td> <td style="text-align: right;">120</td> <td>Spring-Fall</td> <td style="text-align: center;">Yes</td> </tr> </table>	<p><b>Computer Aided Engineering</b> <i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>ME 342</td><td style="text-align: right;">3</td></tr> <tr><td>ME 425</td><td style="text-align: right;">3</td></tr> <tr><td>ME 438</td><td style="text-align: right;">3</td></tr> <tr><td>ME 460</td><td style="text-align: right;">3</td></tr> </table> <p><b>Engineering Mechanics</b> <i>Take this course:</i></p> <table style="width: 100%; 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## Foundation Requirements for BS in Civil Engineering

Academic Fundamentals	Cultural Awareness	Eternal Truths		Program Notes:
<b>Quantitative Reasoning</b> <i>Take these courses:</i> FDMAT 112      4 4	<b>American Foundations</b> <i>Take 1 course:</i> FDAMF                      3 FDCIV 101                3 3	<b>Family Foundations</b> <i>Take these courses:</i> FDREL 200                2 FDREL 225                2 FDREL 250                2 FDREL 275                2 8	<i>cont. from previous column</i> FDREL 261                2 FDREL 301                2 FDREL 302                2 FDREL 324                2 FDREL 325                2 FDREL 327                2 FDREL 333                2 FDREL 341                2 FDREL 342                3 FDREL 343                3 FDREL 351                2 FDREL 352                2 FDREL 390R              2 FDREL 404                2 FDREL 431                2 FDREL 471                2 FDREL 475                2 6	<b>•Students must maintain a minimum grade of C- in their major courses</b>
<b>Reading and Writing</b> <i>Take these courses:</i> FDENG 101                3 FDENG 301                3 6	<b>Humanities Foundations</b> <i>Take this course:</i> FDHUM 110                3 3	<b>Other Religion Courses</b> <i>Take 6 credits:</i> FDREL 100                2 FDREL 130                2 FDREL 190                1-3 FDREL 211                2 FDREL 212                2 FDREL 215                2 FDREL 234                2 FDREL 235                2 6 <i>cont. in next column</i>		
<b>Science</b> <i>Take these courses:</i> FDSCI 101                2 CHEM 105                4 PH 121                      3 ME 201                      2 11	<b>OR</b> <b>World Foundations</b> <i>Take these courses:</i> FDWLD 101                3 FDWLD 201                3 6			

### Course Descriptions

### Credits\*

#### CE 321 Structural Analysis

(3:3:0:0)

Prerequisites: ME 142 and ME 202  
Corequisite: 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

(3:2:2:0)

Prerequisite: ME 202

Determination of stresses in soils, soil strength, consolidation, and settlement. Applications in fluid flow, lateral earth pressure, and bearing pressure.  
(Winter)

#### CE 351 Environmental Engineering

(3:3:0:0)

Prerequisites: CHEM 105 and MATH 330

Environmental concerns and evaluation methodology; pollution control and engineering management approaches.  
(Winter)

#### CE 361 Introduction to Transport Engineering

(3:3:2:0)

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

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

#### CE 370 Hydrology

(3:2:2:0)

Prerequisites: MATH 330 and ME 360

Principles and processes governing the movement of water through the hydrologic cycle. Hydrologic statistics and frequency analysis techniques supplemented with current software.  
(Fall)

#### CE 421 Structural Steel Design

(3:3:0:0)

Prerequisites: ME 250 and CE 321

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

#### CE 424 Reinforced Concrete Design

(3:3:0:0)

Prerequisites: ME 250 and 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

(3:3:0:0)

Prerequisites: ME 360 and CE 351

Application of fluid mechanic principles to analyze and design hydraulic structures and systems.  
(Fall)

#### CE 441 Geotechnical Engineering Design

(3:3:0:0)

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

(3:2:2:0)

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

(3:2:2:0)

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)

#### ME Competency Exam- Fundamentals of Engineering Competency 1

Competency Exam required of all Mechanical and Civil Engineering majors prior to taking upper division engineering classes. Topics on the exam include statics (ME 201), mechanics of materials (ME 202), and dynamics (ME 204). Students should wait until they have completed these courses before they take the exam. The exam is offered the 1st, 9th, and 11th week of each semester.  
(Fall, Winter, Spring)