**Department of Civil, Construction, and Environmental Engineering**

**Chair:** Fouad H. Fouad, PhD  
**Assistant Chair:** Andrew Sullivan

**Degree Offered**  
Bachelor of Science in Civil Engineering

**Accreditation**  
The Bachelor of Science in Civil Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

**Website**  
https://www.uab.edu/engineering/civil/undergraduate

**Program Director**  
Andrew Sullivan  
**Email**  
asullivan@uab.edu  
**Phone**  
205-934-8430

The Department of Civil, Construction, and Environmental Engineering offers a broad education in civil engineering, which covers mechanics and structures, soils, surveying, transportation, water resources, environmental engineering, and construction engineering management. Computer applications are emphasized in all areas. The program is based on a strong foundation of mathematics, physical sciences, humanities, and social sciences and is supported by a series of basic courses from other engineering disciplines. The primary objective of the program is to prepare students for entry into the civil engineering profession as design engineers.

Electives in the academic program may be selected from courses in construction engineering management, environmental engineering, structural engineering, and transportation engineering. These courses allow students to emphasize a particular area in their undergraduate academic program. Judicious selection of these electives may be used as additional preparation for a specific design career or for entry into a specialized civil engineering certificate or engineering graduate program.

Qualified, motivated undergraduate students may also participate in the Departmental Honors Program.

Please refer to the School of Engineering overview for policies regarding admission; change of major; transfer credit; transient status; dual degree programs; reasonable progress; academic warning, probation, and suspension; reinstatement appears; and graduation requirements.

**Vision**  
To be a nationally and internationally recognized, research-oriented Department of Civil, Construction, & Environmental Engineering: a top choice for civil engineering students, faculty, and industry partners.

**Mission**  
To prepare graduates to be immediately productive and able to adapt to a rapidly changing environment, and to become leaders who will create and apply knowledge for the benefit of society.

**Program Educational Objectives**  
Three to five years after graduation, our graduates will have:

1. Achieved a level of technical competency that allows them to advance in civil engineering practice.
2. Practiced civil engineering with ethical, social, and environmental responsibility, aiming at the sustainable development of society.
3. Complemented their education through graduate studies, professional development and continuing education courses, and through involvement in professional societies.

**Student Outcomes**  
Upon completion of the BSCE degree program, our graduates will have:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

**Experiential Learning**  
The Civil, Construction, and Environmental Engineering Department strongly encourages students to participate in experiential learning opportunities, such as industry co-ops, engineering internships, and research with department faculty. These opportunities greatly enhance a student’s education and provide the real-world experience employers look for after graduation. The Civil, Construction, and Environmental Engineering Department has partnerships in place with many local engineering employers and will work with students to tailor programs of study that will allow them to participate in these experiences while completing their degrees in a timely manner. The School of Engineering also has a dedicated staff member to assist students in finding and applying to these opportunities.
Bachelor of Science in Civil Engineering

Requirements | Hours
--- | ---
**Core Curriculum as Specified for Engineering Majors** | 36
Area I: Written Composition (6 hrs)
Area II: Humanities and Fine Arts (9 hrs)
Area III: Natural Sciences and Mathematics (12 hrs)
MA 125 | Calculus I
PH 221 | General Physics I
& 221L | and General Physics Laboratory I
& 221R | and General Physics I Recitation
PH 222 | General Physics II
& 222L | and General Physics Laboratory II
& 222R | and General Physics II - Recitation
Area IV: History, Social, and Behavioral Sciences (9 hrs)

**Other Required Courses** | 83
CE 200 | Engineering Geology
CE 210 | Statics
CE 220 | Mechanics of Solids
& CE 221 | and Mechanics of Solids Laboratory
CE 222 | Civil Engineering Materials Laboratory
CE 230 | Plane Surveying
& 230L | and Plane Surveying Laboratory
CE 236 | Environmental Engineering
& 236L | and Environmental Engineering Laboratory
CE 332 | Soil Engineering
& 332L | and Soil Engineering Laboratory
CE 337 | Hydraulics
CE 344 | Civil Engineering Analysis I
CE 345 | Transportation Engineering
CE 360 | Structural Analysis
CE 371 | Professional Preparation
CE 395 | Engineering Economics
CE 426 | Foundation Engineering
CE 430 | Water Supply/Drainage Design
CE 450 | Structural Steel Design
CE 455 | Reinforced Concrete Design
CE 497 | Construction Engineering Management
CE 498 | Capstone Design Project Lab
& CE 499 | and Capstone Design Project
CH 115 | General Chemistry I
& 115R | and General Chemistry I Recitation
& CH 116 | and General Chemistry I Laboratory
CH 117 | General Chemistry II
& 117R | and General Chemistry II Recitation
& CH 118 | and General Chemistry II Laboratory
EGR 110 | Introduction to Engineering I
& EGR 111 | and Introduction to Engineering II
or EGR 210 | Introduction to Engineering
EGR 150 | Computer Methods in Engineering
EGR 265 | Math Tools for Engineering Problem Solving
MA 126 | Calculus II
ME 102 | Engineering Graphics
ME 215 | Dynamics
& 215R | and Dynamics Recitation
ME 251 | Introduction to Thermal Sciences

**Civil Engineering Electives** | 9
Select nine hours from Civil Engineering (CE) courses.  

| CE 600 | Sustainable Construction |
| CE 605 | Project Management |
| CE 607 | Engineering Entrepreneurship |
| CE 631 | Environmental Law |
| CE 649 | Engineering Liability |

**Environmental Engineering Electives**

| CE 431 | Energy Resources |
| CE 433 | Solid and Hazardous Wastes Management |
| CE 434 | Air Quality Modeling and Monitoring |
| CE 480 | Introduction to Water and Wastewater Treatment |
| CE 485 | Engineering Hydrology |

**Structural Engineering Electives**

| CE 415 | Building Information Modeling (BIM) |
| CE 420 | Advanced Mechanics |
| CE 453 | Design of Wood Structures |
| CE 454 | Design of Masonry Structures |
| CE 456 | Prestressed Concrete Design |
| CE 460 | Structural Mechanics |
| CE 461 | Introduction to the Finite Element Method |
| CE 462 | Advanced Structural Analysis |
| CE 464 | Structural Dynamics |
| CE 467 | Wind and Seismic Loads |
| CE 468 | Bridge Engineering |

**Transportation Engineering Electives**

| CE 443 | Pavement Design and Construction |

**Total Hours** 128

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1 Students wishing to enroll in graduate level courses (500 and above) must submit an appeal to the Graduate School (https://www.uab.edu/graduate/images/documents/resources/current_students/forms/enrollment-grad-coursework.pdf)

**Concentration in Sustainable Engineering Design and Construction**

Students seeking the degree of BSCE may add a concentration in Sustainable Engineering and Construction by appropriate selection of their Civil Engineering Electives courses (9 credit hours total).

Requirements | Hours
--- | ---
**Select three of the following courses:** | 9
CE 431 | Energy Resources
CE 433 | Solid and Hazardous Wastes Management
CE 434 | Air Quality Modeling and Monitoring
CE 600 | Sustainable Construction
CE 608 | Green Building Design

**Total Hours** 9

Please refer to the School of Engineering Overview for School policies related to admission, academic progress, reasonable progress toward degree, and graduation.
Curriculum for the Bachelor of Science in Civil Engineering (BSCE)

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Hours First Term</th>
<th>Hours Second Term</th>
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<tbody>
<tr>
<td>CH 115 &amp; 115R &amp; CH 116 EGR 110</td>
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<td>CH 117 &amp; 117R &amp; CH 118</td>
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<tr>
<td>EH 101 ME 102 MA 125</td>
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<td>PH 221 &amp; 221L &amp; 221R</td>
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<tr>
<th>Sophomore</th>
<th>Hours First Term</th>
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<tr>
<td>CE 210 &amp; 222L EGR 265</td>
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<td>CE 220 &amp; 236L &amp; 215R</td>
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<tr>
<td>Core Curriculum Area II: Humanities and Fine Art EGR 150</td>
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<tr>
<th>Junior</th>
<th>Hours First Term</th>
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<tr>
<td>CE 230 &amp; 230L CE 337 CE 332 &amp; 332L ME 251</td>
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<td>CE 222</td>
<td>3</td>
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<tr>
<td>Core Curriculum Area IV: History, Social, and Behavioral Science CE 344 CE 371</td>
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<td>CE 345 CE 430</td>
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<tr>
<th>Senior</th>
<th>Hours First Term</th>
<th>Hours Second Term</th>
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<tbody>
<tr>
<td>CE 455 CE 497 Civil Engineering Elective</td>
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<td>CE 426 CE 450</td>
<td>3</td>
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<tr>
<td>Core Curriculum Area II: Humanities and Fine Art</td>
<td>3</td>
<td>CE 498 &amp; CE 499</td>
<td>3</td>
</tr>
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<td>Core Curriculum Area IV: History, Social, and Behavioral Science</td>
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<td>Core Curriculum Area IV: History, Social, and Behavioral Science</td>
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<td>18</td>
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</table>

Total credit hours: 128

1. Transfer students may substitute EGR 200 for EGR 110 and EGR 111.
2. Students may also replace EGR 265 and a CE elective with MA 227 and MA 252.
3. Please refer to the Core Curriculum as specified for Engineering majors.
4. Any CE course not included as a requirement for the CE major may be selected.

The Department of Civil, Construction, and Environmental Engineering offers six Category A Certificates in the following areas:

- Certificate in Construction Engineering Management
- Certificate in Environmental Engineering
- Certificate in Geotechnical Engineering
- Certificate in Structural Engineering
- Certificate in Sustainable Engineering Management
- Certificate in Transportation Engineering

The requirements are as follows:

- Students must be admitted to the Department as either undergraduate or graduate students in Civil, Construction, and Environmental Engineering
- Certificates require a minimum of 15 semester hours consisting of one required undergraduate course (which will also count toward the BSCE degree at UAB) and four graduate level elective courses in the area of specialization
- Graduate level elective courses taken may be applied to the certificate as well as a MSCE degree
- One course, up to three semester hours, may be transferred from another institution; this may be the required course or one of the graduate level courses
- Only one course listed with an asterisk (*) may be applied to a certificate; i.e., for the transportation certificate, students may apply either CE 649 or CE 658
- Courses taken from UA and UAH by IITS may be applied to certificates
- Elective course may be taken at the 500, 600, or 700 level

Certificate in Construction Engineering Management

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Required Course</td>
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<table>
<thead>
<tr>
<th>Engineering Electives</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Select four courses from the following:</td>
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<tr>
<td>CE 600 Sustainable Construction</td>
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<tr>
<td>CE 605 Project Management</td>
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<td>CE 607 Engineering Entrepreneurship</td>
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<td>CE 608 Green Building Design</td>
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<td>CE 631 Environmental Law</td>
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<tr>
<td>CE 649 Engineering Liability</td>
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<tr>
<td>CE 658 Engineering Management</td>
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<tr>
<td>CE 692 CE Capstone Project</td>
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Certificate in Environmental Engineering

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Required Course</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Engineering Electives</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 236 Environmental Engineering (or equivalent)</td>
<td>3</td>
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</tbody>
</table>
Select four courses from the following: 12
CE 530  Water Supply/Drainage Design
CE 533  Solid and Hazardous Wastes Management
CE 534  Air Quality Modeling and Monitoring
CE 544  Civil Engineering Analysis II
CE 580  Introduction to Water and Wastewater Treatment
CE 631  Environmental Law
CE 632  Industrial Waste and Wastewater Treatment
CE 636  Stormwater Pollution Management
CE 638  Water and Wastewater Chemistry
CE 639  Sediment Sources and Controls
CE 640  Wastewater Treatment Engineering
CE 649  Engineering Liability
CE 658  Engineering Management
CE 681  Environmental Chemistry
CE 685  Engineering Hydrology

Certificate in Geotechnical Engineering

Requirements

<table>
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<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Required Course</td>
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<tr>
<td>CE 332  Soil Engineering (or equivalent)</td>
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</tbody>
</table>

Engineering Electives

Select courses from the following: 12
CE 526  Foundation Engineering
CE 544  Civil Engineering Analysis II
CE 649  Engineering Liability
CE 658  Engineering Management
CE 690  Special Topics in (Area)

Certificate in Structural Engineering

Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Required Course</td>
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<tr>
<td>CE 360  Structural Analysis</td>
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Engineering Electives

Select electives from the following list to earn 12 semester hours: 12
Structural Analysis Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 516  Mechanical Vibrations</td>
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<tr>
<td>CE 520  Advanced Mechanics</td>
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<tr>
<td>CE 560  Structural Mechanics</td>
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<tr>
<td>CE 561  Introduction to the Finite Element Method</td>
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<td>CE 562  Advanced Structural Analysis</td>
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<td>CE 564  Structural Dynamics</td>
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<tr>
<td>CE 612  Theory of Elasticity</td>
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<td>CE 615  Theory of Elastic Stability</td>
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<td>CE 617  Theory of Plates and Shells</td>
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<td>CE 663  Finite Element Methods</td>
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Structural Design Electives

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<tr>
<th>Course</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 526  Foundation Engineering</td>
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<tr>
<td>CE 553  Design of Wood Structures</td>
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<td>CE 554  Design of Masonry Structures</td>
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<tr>
<td>CE 556  Prestressed Concrete Design</td>
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<td>CE 567  Wind and Seismic Loads</td>
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<td>CE 568  Bridge Engineering</td>
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<td>CE 650  Advanced Structural Steel</td>
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<td>CE 655  Advanced Reinforced Concrete</td>
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Other Electives (Maximum 3 Hours)
CE 210. Statics. 3 Hours.
Prerequisites: CE 200 [Min Grade: C]

CE 220. Mechanics of Solids. 3 Hours.
Prerequisites: CE 210 [Min Grade: C]

CE 221. Mechanics of Solids Laboratory. 1 Hour.
Standard tensile, torsion, bending, and column tests. Strain gage installation and applications. Measurement of forces, displacements, strains, and other variables. Writing is a significant component of this course.
Prerequisites: CE 220 [Min Grade: D]

CE 222. Civil Engineering Materials Laboratory. 1 Hour.
Materials testing laboratory evaluating properties of materials of construction such as cement, aggregates, concrete, asphalt, and masonry. Design of Portland cement concrete mixes. Writing is a significant component of this course.
Prerequisites: CE 220 [Min Grade: D]

CE 230. Plane Surveying. 3 Hours.
Care and use of surveying instruments, surveying methods, error theory, traversing, stadia, mapping techniques, circular and parabolic curves, areas, and volumes. CE 230L must be taken concurrently.
Prerequisites: MA 125 [Min Grade: C]

CE 230L. Plane Surveying Laboratory. 0 Hours.
To provide the student with an understanding of the principles of land measurement, the instruments and techniques used in surveying, theory of errors and mathematical precision in engineering analysis and design. To provide an introduction to route surveying, and the principles of horizontal and vertical curves. Companion to CE 230 and must be taken concurrently.

CE 236. Environmental Engineering. 3 Hours.
Air/water pollution and solid waste. Quality of environment. Environmental health. Regulations and legal considerations. Ethics and Civic Responsibility are significant components of this course.
Prerequisites: MA 125 [Min Grade: C] or MA 225 [Min Grade: C]

CE 236L. Environmental Engineering Laboratory. 0 Hours.
Laboratory equipment and methods. Chemical, and physical tests to determine characteristics of water and wastewater. Companion lab to CE 236 and must be taken concurrently.

CE 332. Soil Engineering. 4 Hours.
Soil identification and properties, stress concepts, permeability settlement analysis, soil compaction, bearing capacity, shear strength of soil, and slope stability. CE 332L must be taken concurrently.
Prerequisites: CE 200 [Min Grade: D] and CE 220 [Min Grade: D]

CE 332L. Soil Engineering Laboratory. 0 Hours.
Soil classification, strength tests, permeability and consolidation tests. Companion to CE 332 and must be taken concurrently.

CE 337. Hydraulics. 3 Hours.
Fundamentals of hydraulics including properties of water; hydrostatic forces and pressures; flow, head losses, and related phenomena in pipes; river hydograph routing; statistical hydrology; flow in open channels; culvert design; applied hydraulic modeling. Must have a grade of C or better to complete the course.
Prerequisites: MA 126 [Min Grade: C] or MA 226 [Min Grade: C]

CE 344. Civil Engineering Analysis I. 3 Hours.
Introduction to probability. Basic data analysis using comparisons and regression, hypothesis testing, and analysis of variance. Quality control and reliability analyses. Quantitative Literacy is a significant component of this course.
Prerequisites: MA 126 [Min Grade: C] or MA 226 [Min Grade: C]

CE 345. Transportation Engineering. 3 Hours.
Function, influence, characteristics and operation of transportation systems and facilities, focusing primarily on highway systems. Geometric design, operations, and transportation planning are covered.
Prerequisites: MA 125 [Min Grade: C] or MA 225 [Min Grade: C] and PH 221 [Min Grade: C]

CE 360. Structural Analysis. 3 Hours.
Reactions, shears, moments, and axial forces in determinate and indeterminate structures. Influence lines; moment area and energy methods of computing deflections; methods of truss and frame analysis. Computer applications. Must have a grade of C or better to complete the course.
Prerequisites: CE 220 [Min Grade: D]

CE 371. Professional Preparation. 2 Hours.
Introduces engineering students to skills necessary for their professional development. Topics include forms of technical writing and oral communication, report writing and organization, professional practice, and ethics.
Prerequisites: EH 102 [Min Grade: C] and (EGR 111 [Min Grade: C] or EGR 200 [Min Grade: C])

CE 395. Engineering Economics. 3 Hours.
Fundamental concepts of engineering economy. Introduction to cost and revenue estimating and cash flow analysis for engineering projects. Choosing between alternatives taking into account the time value of money, depreciation, inflation, income taxes and risk factors.
Prerequisites: MA 125 [Min Grade: C] or MA 225 [Min Grade: C]

CE 395R. Engineering Economics Recitation. 0 Hours.
An applications-based course designed to reinforce concepts from CE 395.

CE 410. FE Review for Civil Engineers. 0 Hours.
Review concepts of the engineering core and civil engineering in preparation for the Fundamentals of Engineering (FE) exam.
CE 415. Building Information Modeling (BIM). 3 Hours.
This class will be an introduction to the virtual world of design and construction. Topics covered will include uses for technology, what is BIM, and will have a focus on AutoCAD and Revit Software. An emphasis will be placed on the use of these tools and their practical applications to the real world environment. Students will be provided with the software through the Autodesk Student community and will be required to complete a Multi-Step term Project.
Prerequisites: ME 102 [Min Grade: C]

CE 420. Advanced Mechanics. 3 Hours.
Variation of stress at point including determination of principal and maximum shear stresses. Basic problems involving symmetrical deformation; thickwall cylinders and spheres. Torsions of noncircular sections. Curved beams. Failure Theories. Unsymmetrical bending and shear center.
Prerequisites: CE 220 [Min Grade: D]

CE 426. Foundation Engineering. 3 Hours.
Application of principles of soil mechanics to: determine bearing capacity and settlement of spread footings, mats, single piles and pile groups; site investigation, evaluate data from field and tests; estimation of stresses in soil masses; lateral resistance of piles and pile group; retaining walls, sheetpiles, and coffer-dams.
Prerequisites: CE 332 [Min Grade: D] and CE 455 [Min Grade: D]

CE 430. Water Supply/Drainage Design. 3 Hours.
Water requirements; wastewater characteristics. Hydraulics and design of sewers; distribution and reuse of water. Development of water supplies; design considerations.
Prerequisites: CE 337 [Min Grade: C]

CE 431. Energy Resources. 3 Hours.
Overview of the various energy resources: oil, natural gas, coal, nuclear, hydro, solar, geothermal, biomass, wind, and ocean energy resources, in terms of supply, distribution, recovery and conversion, environmental impacts, economies, policy, and technology. Advantages and limitations of various energy resources. Concepts and opportunities for energy conservation; including electric power generation, changing role of electric utilities, transportation applications, and energy use in developing countries. Field trips.
Prerequisites: CE 236 [Min Grade: D]

CE 433. Solid and Hazardous Wastes Management. 3 Hours.
Overview of waste characterization, regulations, and management options. The course covers fundamentals of landfill design, recycling, incineration, emerging disposal technologies, federal and state laws, and hazardous waste treatment, and ultimate disposal of hazardous waste.
Prerequisites: CE 236 [Min Grade: D]

CE 434. Air Quality Modeling and Monitoring. 3 Hours.
Atmospheric pollutant effects, reactions and sources. Air dispersion modeling. Ambient monitoring.
Prerequisites: ME 251 [Min Grade: C]

CE 440. Civil Engineering Honors Research. 3 Hours.
Departmental honors students work closely with faculty researchers and graduate students in departmental concentration specialties to develop research skills. Enrollment is limited to undergraduate students enrolled in CCEE Departmental Honors Program.

CE 441. Civil Engineering Honors Seminar. 1 Hour.
Seminar focusing on student research and guest presentations of various topics of interest to civil and environmental engineering students.

CE 443. Pavement Design and Construction. 3 Hours.
Analysis of stresses and strains in pavement systems. Design and construction of flexible and rigid pavements, base courses, and subgrades. Effects of loading on pavement life.
Prerequisites: CE 345 [Min Grade: D]

CE 450. Structural Steel Design. 3 Hours.
Tension members, columns, beams, and beam columns. Simple connections. Load Resistance Factor Design (LRFD) approaches.
Prerequisites: CE 360 [Min Grade: C]

CE 453. Design of Wood Structures. 3 Hours.
This course will give students an understanding of structural wood materials, both sawn lumber and a number of engineered wood materials. The main objective of the course is to learn how to design wood structures using these materials, including the design of beams, columns, connections, roof diaphragms, and shear walls. The requirement of the National Design Specification for Wood Structures will be addressed.
Prerequisites: CE 360 [Min Grade: C]

CE 454. Design of Masonry Structures. 3 Hours.
Design and detailing of masonry structures. Nomenclature, properties, and specifications for components. Design of assemblages, simple masonry structures, unreinforced and reinforced elements, and complex masonry structures.
Prerequisites: CE 360 [Min Grade: C]

CE 455. Reinforced Concrete Design. 3 Hours.
Behavior, strength, and design of reinforced concrete structural members (beams, columns, one-way slabs, and continuous beams) subjected to moment, shear, and axial forces according to the American Concrete Institute Building Code Requirements for Structural Concrete (ACI 318). Crack control and serviceability considerations. Introduction to the design of reinforced concrete structures.
Prerequisites: CE 360 [Min Grade: C]

CE 456. Prestressed Concrete Design. 3 Hours.
Principles and concepts of design in prestressed concrete including elastic and ultimate strength analyses for flexural, shear, bond, and deflection. Principles of concordancy and linear transformation for indeterminate prestressed structures.
Prerequisites: CE 455 [Min Grade: D]

CE 460. Structural Mechanics. 3 Hours.
Elastic beam deflections, beam columns, lateral torsional buckling, column stability, plastic design, plate bending, and yield line theory.
Prerequisites: CE 360 [Min Grade: C]

CE 461. Introduction to the Finite Element Method. 3 Hours.
Prerequisites: CE 360 [Min Grade: C]

CE 462. Advanced Structural Analysis. 3 Hours.
Analysis of indeterminate structures utilizing both classical and matrix methods. Use of large-scale computer programs.
Prerequisites: CE 360 [Min Grade: C]

CE 464. Structural Dynamics. 3 Hours.
Prerequisites: CE 360 [Min Grade: C] and ME 215 [Min Grade: C]
CE 467. Wind and Seismic Loads. 3 Hours.
Methods for calculating loads on structures caused by extreme winds and earthquakes. Calculation of wind loads on various types of structures according to theory and codes. Determination of earthquake loads on structures using structural dynamics and codes.
Prerequisites: CE 360 [Min Grade: C]

CE 468. Bridge Engineering. 3 Hours.
Bridge loads, steel beam bridges, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodologies; computer applications.
Prerequisites: CE 450 [Min Grade: D] and CE 455 [Min Grade: D] (Can be taken Concurrently)

CE 470. International Research Experience. 3 Hours.
The International Research Experience for Students (IRES) program provides the opportunity for undergraduate and graduate students to participate in hands-on engineering research in an international setting. Students perform research on an approved topic related to civil engineering design in an international environment. Students select a topic, perform a detailed literature review, and work with mentors from UAB and the international host institution to develop research objectives and a detailed research plan. The course will culminate in a 6-8 week visit to the international host institution, during which time students will conduct hands-on research with their mentors and prepare final reports.
Prerequisites: CE 497 [Min Grade: C]

CE 475. Construction Safety and Health Management. 3 Hours.
This course covers various causes of construction accidents and the adopted strategies to prevent worksite injuries and illnesses. Other topics covered include workers’ compensation, OSHA standards for the construction industry, economics of construction safety management, temporary structures, system safety, ergonomic applications, health hazards, and the development of a safety program.
Prerequisites: CE 497 [Min Grade: C]

CE 480. Introduction to Water and Wastewater Treatment. 3 Hours.
Physical unit operations and chemical/biological unit processes for water and wastewater treatment. Design of facilities for treatment. Treatment and disposal of sludge.
Prerequisites: CE 236 [Min Grade: D]

CE 485. Engineering Hydrology. 3 Hours.
Hydrologic principles including the hydrologic cycle, precipitation data and stream-flow measurements. Applications to engineering problems: stream-flow analysis, and watershed management.
Prerequisites: CE 337 [Min Grade: C]

CE 489. Undergraduate Engineering Research. 0 Hours.
Undergraduate research experiences in civil, construction and/or environmental engineering.
Prerequisites: EGR 110 [Min Grade: C] and EGR 111 [Min Grade: C] or EGR 200 [Min Grade: C] or HC 111 [Min Grade: C] or EGR 100 [Min Grade: C] or MA 125 [Min Grade: C] or MA 225 [Min Grade: C] and PH 221 [Min Grade: C] (Can be taken Concurrently)

CE 490. Special Topics in Civil Engineering. 1-3 Hour.
Special Topics in Civil Engineering.

CE 491. Individual Study in Civil Engineering. 1-6 Hour.
Individual Study in Civil Engineering.

CE 497. Construction Engineering Management. 3 Hours.
Study of construction management services that include: project planning, scheduling, estimating, budgeting, contract administration, agreements and ethics. Emphasis is made on the management of manpower, materials, money and machinery.
Prerequisites: CE 395 [Min Grade: D]

CE 498. Capstone Design Project Lab. 0 Hours.
Review of engineering, math, and science topics in preparation for the FE exam. The importance of professional licensure and professional development are also covered. Students must register for and take the FE exam in order to receive credit for this course. CE 499 must be taken concurrently.

CE 499. Capstone Design Project. 3 Hours.
Students work in teams to complete a capstone design project that incorporates the major aspects of civil engineering design including structural, geotechnical, environmental, transportation, and construction management components. The course also includes lecturing and assignments related to professionalism including engineering ethics, leadership, and management. Normally taken during last term before graduation. CE 498 is a companion lab and must be taken concurrently.
Prerequisites: CE 332 [Min Grade: D] and CE 337 [Min Grade: C] and CE 345 [Min Grade: D] and CE 345 [Min Grade: D] and CE 450 [Min Grade: D] or CE 455 [Min Grade: D] and CE 430 [Min Grade: D] (Can be taken Concurrently) or CE 480 [Min Grade: D] (Can be taken Concurrently) and CE 497 [Min Grade: D] (Can be taken Concurrently)