

# Civil Engineering

**Chair:** Avinash Unnikrishnan, PhD

Degree Offered	Bachelor of Science in Civil Engineering (BSCE)
Accreditation	The Bachelor of Science in Civil Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, <a href="https://www.abet.org">https://www.abet.org</a> , under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs.
Website	<a href="https://www.uab.edu/engineering/civil/undergraduate">https://www.uab.edu/engineering/civil/undergraduate</a>
Program Director	Christopher Waldron, PhD, PE
Email	<a href="mailto:cwaldron@uab.edu">cwaldron@uab.edu</a>
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. In addition to the Blazer Core, the program is based on a strong foundation of mathematics and physical 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; dual degree programs; reasonable progress; academic warning, probation, and suspension; 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, to be 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 licensure, and continuing education, and 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 Department of Civil, Construction, and Environmental Engineering 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 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 office to assist students in finding and applying to these opportunities.

## Bachelor of Science in Civil Engineering

Requirements	Hours
<b>Blazer Core Requirements</b>	<b>43</b>
CH 115 & 115R & CH 116	General Chemistry I and General Chemistry I Recitation and General Chemistry I Laboratory
EH 101	English Composition I
EH 102	English Composition II
EGR 103	Computer Aided Graphics and Design
EGR 200	Introduction to Engineering <sup>1</sup>

MA 125 & 125L	Calculus I and Calculus I Lab
PH 221 & 221L & 221R	General Physics I and General Physics Laboratory I and General Physics I Recitation
PH 222 & 222L & 222R	General Physics II and General Physics Laboratory II and General Physics II - Recitation
Academic Foundations: Reasoning	
Thinking Broadly: History & Meaning	
Thinking Broadly: Creative Arts	
Thinking Broadly: Humans & Their Societies	
City as a Classroom <sup>2</sup>	
<b>Other Required Courses</b>	<b>76</b>
CE 200	Engineering Geology
CE 210	Statics
CE 220	Mechanics of Solids
CE 221	Mechanics of Solids Laboratory
CE 222	Civil Engineering Materials Laboratory
CE 230 & 230L	Plane Surveying and Plane Surveying Laboratory
CE 236 & 236L	Environmental Engineering and Environmental Engineering Laboratory
CE 332 & 332L	Soil Engineering and Soil Engineering Laboratory
CE 337 & 337L	Hydraulics and Hydraulics Laboratory
CE 344	Civil Engineering Analysis I
CE 345	Transportation Engineering
CE 360	Structural Analysis
CE 371	Engineering Communication
CE 395	Engineering Economics
CE 426	Foundation Engineering
CE 430 & 430L	Water Supply/Drainage Design and Water Supply/Drainage Design Laboratory
CE 450	Structural Steel Design
CE 455	Reinforced Concrete Design
CE 497	Construction Engineering Management
CE 499	Capstone Design Project
CH 117 & 117R & CH 118	General Chemistry II and General Chemistry II Recitation and General Chemistry II Laboratory
EGR 150	Computer Methods in Engineering
EGR 194	Engineering Explorations
EGR 265	Math Tools for Engineering Problem Solving <sup>2</sup>
MA 126	Calculus II <sup>3</sup>
ME 215 & 215R	Dynamics and Dynamics Recitation
ME 251	Introduction to Thermal Sciences
<b>Civil Engineering Electives</b>	<b>9</b>
Select 9 credit hours from Civil Engineering (CE) elective courses.	
<b>Construction Engineering Management Electives</b>	
CE 415	Building Information Modeling (BIM)
CE 465	CE Construction Documents
CE 475	Construction Safety and Health Management
CECM 670	Construction Estimating and Bidding <sup>4</sup>
CECM 671	Construction Liability & Contracts <sup>4</sup>
CECM 672	Construction Methods and Equipment <sup>4</sup>
CECM 676	Construction Project Risk Management <sup>4</sup>

**Environmental Engineering Electives**

CE 431	Energy Resources
CE 433	Solid and Hazardous Wastes Management
CE 434	Air Quality Modeling and Monitoring
CE 446	Green Infrastructure and Transportation
CE 447	Principles of Sustainable Development
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
CE 446	Green Infrastructure and Transportation

<b>Total Hours</b>	<b>128</b>
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<sup>1</sup> EGR 200 preferred; other FYE courses accepted

<sup>2</sup> CE 280 preferred; other CAC courses accepted

<sup>3</sup> May substitute MA 227 and MA 252 for EGR 265 and one CE elective

<sup>4</sup> Students wishing to enroll in graduate level courses (500 and above) must submit an [Undergraduate Student Enrollment in Graduate Level Coursework](#) permission form.

## Residency Requirement

In addition to UAB's residency requirement, to earn a Bachelor of Science in Civil Engineering from UAB, students must successfully complete 15 credit hours of civil engineering courses at the 400- or higher level at UAB. These 15 credit hours must include CE 499 Capstone Design Project.

## 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 9 credit hours from the following courses:	9
CE 431	Energy Resources
CE 600	Sustainable Construction
CE 608	Green Building Design
CE 446	Green Infrastructure and Transportation
CE 447	Principles of Sustainable Development
<b>Total Hours</b>	<b>9</b>

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)

### Freshman

First Term	Hours	Second Term	Hours
CH 115 & 115R & CH 116 <sup>^</sup> EGR 200 <sup>1</sup> EH 101 <sup>%</sup> MA 125 & 125L		4 CH 117 & 117R & CH 118 3 EGR 103 <sup>#</sup> 3 EGR 194 4 MA 126  PH 221 & 221L & 221R <sup>^</sup>	4  3 1 4  4
		<b>14</b>	<b>16</b>

### Sophomore

First Term	Hours	Second Term	Hours
CE 210 EGR 150 EGR 265 <sup>2</sup> EH 102 <sup>%</sup>  PH 222 & 222L & 222R <sup>^</sup>		3 CE 200 3 CE 220 4 CE 221 3 CE 236 & 236L 4 ME 215  Blazer Core: Reasoning <sup>3</sup>	2 3 1 3  3
		<b>17</b>	<b>15</b>

### Junior

First Term	Hours	Second Term	Hours
CE 230 & 230L CE 332 & 332L CE 337 & 337L CE 344 CE 371  ME 251		3 CE 222 4 CE 345 3 CE 360 3 CE 395 2 CE 430 & 430L 2 Blazer Core: Creative Arts <sup>3</sup>	1 3 3 3 3  3
		<b>17</b>	<b>16</b>

### Senior

First Term	Hours	Second Term	Hours
CE 455 CE 497 Civil Engineering Elective <sup>4</sup> Civil Engineering Elective <sup>4</sup> Blazer Core: Humans & Their Societies <sup>3</sup>		3 CE 426 3 CE 450 3 CE 499 3 Civil Engineering Elective <sup>4</sup> 3 Blazer Core: History & Meaning <sup>3</sup>	3 3 3 3 3

Blazer Core: City as  
a Classroom<sup>\$</sup> 3

18

15

Total credit hours: 128

- <sup>1</sup> EGR 200 preferred; other FYE courses accepted
- <sup>2</sup> May substitute MA 227 and MA 252 for EGR 265 and one CE elective
- <sup>3</sup> Please refer to Blazer Core as specified for engineering majors.
- <sup>4</sup> Any 400+ level CE course not included as a requirement for the CE major may be selected.

<sup>^</sup> Satisfies Blazer Core: Scientific Inquiry

<sup>%</sup> Satisfies Blazer Core: Writing

<sup>#</sup> Satisfies Blazer Core: Communicating in the Modern World

<sup>\*</sup> Satisfies Blazer Core: Quantitative Literacy

<sup>\$</sup> CE 280 preferred; other CAC courses accepted

Category A certificates are offered by the Department of Civil, Construction, and Environmental Engineering. Any undergraduate or graduate student in good standing who is pursuing a Civil Engineering degree (BSCE, MSCE, or PhD) may elect to simultaneously complete the requirements of his or her degree program and the Certificate Program. These certificates are listed on student transcripts and in the university commencement program. Certificates can be earned in:

- [Construction Engineering Management](#)
- [Environmental Engineering](#)
- [Structural Engineering](#)
- [Sustainable Engineering](#)
- [Transportation Engineering](#)

Civil Engineering (BSCE) graduates who complete the Certificate Program will have greater depth in a specific technical area. The certificates also allow a means for practicing engineers to acquire expertise beyond a Bachelor's degree, and have it formally recognized without completing a program leading to a Master's degree. This technical expertise will enhance their proficiency and marketability. Up to 12 graduate level credit hours taken for a certificate may be applied toward the MSCE degree.

The requirements are as follows:

- Students must be admitted to the Department as either undergraduate (BSCE) or graduate (MSCE) students in Civil, Construction, and Environmental Engineering or hold a BS in Civil Engineering or a closely related field from an accredited institution.
- Certificates require a minimum of 15 credit hours consisting of five graduate level courses in the area of specialization. Certificates for undergraduate students will be awarded upon completion of the BSCE degree.
- Graduate level elective courses 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.
- Graduate courses taken from the University of Alabama, University of South Alabama, and University of Alabama in Huntsville via IITS may be applied to certificates with prior approval of the graduate program director.

- Elective courses may be taken at the 500, 600, or 700 level. Special topics courses (CE 590, CE 690, or CE 790) may be applied to certificates with prior approval of the graduate program director.
- Undergraduate students wishing to enroll in graduate level courses (500 and above) must submit an [Undergraduate Student Enrollment in Graduate Level Coursework](#) permission form.

## Certificate in Construction Engineering Management

Requirements	Hours
<b>Required Course</b>	
CE 597 Construction Engineering Management	3
<b>Electives</b>	
Select 12 credit hours from the following:	
CE 565 CE Construction Documents	
CE 575 Construction Safety and Health Management	
CE 600 Sustainable Construction	
CECM 669 Advanced Project Management	
CECM 670 Construction Estimating and Bidding	
CECM 671 Construction Liability & Contracts	
CECM 672 Construction Methods and Equipment	
CECM 673 Project Planning and Control	
CECM 674 Green Building Design/Construction	
CECM 675 Advanced Construction and Engineering Economics	
CECM 676 Construction Project Risk Management	
CECM 688 Construction Management and Leadership Challenges in the Global Environment	
CECM 689 Building Information Modeling (BIM) Techniques	

## Certificate in Environmental Engineering

Requirements	Hours
Select 15 credit hours from the following:	
CE 530 Water Supply/Drainage Design	
CE 533 Solid and Hazardous Wastes Management	
CE 534 Air Quality Modeling and Monitoring	
CE 546 Green Infrastructure and Transportation	
CE 547 Principles of Sustainable Development	
CE 580 Introduction to Water and Wastewater Treatment	
CE 608 Green Building Design	
CE 640 Wastewater Treatment Engineering	
CE 685 Engineering Hydrology	
CESC 600 Principles of Sustainable Development	
CESC 602 Introduction to Sustainable Smart Cities	

## Certificate in Structural Engineering

Requirements	Hours
Select 15 credit hours from the following:	
CE 516 Mechanical Vibrations	
CE 520 Advanced Mechanics	
CE 526 Foundation Engineering	
CE 553 Design of Wood Structures	
CE 556 Prestressed Concrete Design	
CE 561 Introduction to the Finite Element Method	
CE 562 Advanced Structural Analysis	
CE 564 Structural Dynamics	

CE 567	Wind and Seismic Loads
CE 568	Bridge Engineering
CE 600	Sustainable Construction
CE 650	Advanced Structural Steel
CE 655	Advanced Reinforced Concrete
CESC 602	Introduction to Sustainable Smart Cities <sup>1</sup>
CESC 608	Green Infrastructure and Transportation <sup>1</sup>
CESC 614	Smart Cities Technologies <sup>1</sup>
CESE 653	Wood and Masonry Design
CESE 656	Advanced Mechanics of Materials for Structural Engineering
CESE 659	Advanced Reinforced Concrete
CESE 660	Prestressed Concrete Behavior and Design
CESE 662	Advanced Structural Analysis
CESE 664	Bridge Engineering
CESE 665	Structural Dynamics and Earthquake Engineering
CESE 676	Design of Structural Steel Connections

<sup>1</sup> Only one of these courses can be applied to this certificate

## Certificate in Sustainable Engineering

Requirements	Hours
Select 15 credit hours from the following:	
CE 546	Green Infrastructure and Transportation
CE 547	Principles of Sustainable Development
CE 600	Sustainable Construction
CE 608	Green Building Design
CESC 600	Principles of Sustainable Development
CESC 602	Introduction to Sustainable Smart Cities
CESC 608	Green Infrastructure and Transportation
CESC 610	Health and Livability
CESC 614	Smart Cities Technologies
CESC 616	Big Data and Smart Cities

## Certificate in Transportation Engineering

Requirements	Hours
Select 15 credit hours from the following:	
CE 543	Pavement Design & Construction
CE 546	Green Infrastructure and Transportation
CE 622	Traffic Flow Theory
CE 623	Non-Motorized Transportation Design and Planning
CE 624	Simulation Models for Transportation Applications
CE 625	Intelligent Transportation Systems
CE 646	Traffic Engineering Operations
CE 648	Urban and Transportation Planning
CE 690	Special Topics in (Area) <sup>1</sup>
CECM 669	Advanced Project Management <sup>2</sup>
CECM 671	Construction Liability & Contracts
CESC 600	Principles of Sustainable Development <sup>2</sup>
CESC 602	Introduction to Sustainable Smart Cities <sup>2</sup>
CESC 608	Green Infrastructure and Transportation <sup>2</sup>

<sup>1</sup> Must be approved by Certificate Director

<sup>2</sup> Only one of these courses may be applied to this certificate.