

# STRUCTURAL DESIGN AND CONSTRUCTION ENGINEERING TECHNOLOGY, B.S.

**Begin Campus:** Any Penn State Campus

**End Campus:** Harrisburg

## Program Description

*Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.*

The program in Structural Design and Construction Engineering Technology provides the basic education required for the structural engineer and construction profession. Students learn the basic general engineering concepts needed for this major with emphasis on the fundamentals, structural design principles, and construction techniques through required course work. They are given the opportunity to focus in a discipline of construction management or structural design through a selected option or choose a broad general option. Courses in communication skills, arts, humanities, social and behavioral sciences, and other engineering related areas broaden the program. Students gain experience in working as members of a team and in using interdisciplinary approaches to solve problems. These experiences, as well as those related to design and construction principles, are taught through exercises in the classroom, laboratory, and field. The program culminates with a capstone project course in which the students' knowledge and skills are applied to specific problems.

## What is Structural Design and Construction Engineering Technology?

Structural Design and Construction Engineering Technology is a discipline concerned with basic structural engineering principles and construction techniques, building site inspection, site supervision, construction personnel supervision, plan and specification interpretation, supply logistics and procurement, applicable building codes, and report preparation.

### You Might Like This Program If...

- You like hands-on and creative problem-solving.
- You work well within collaborative, multidisciplinary teams.
- You are interested in a career in the construction industry.

## Entrance to Major

In order to be eligible for entrance to this major, a student must:

1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have third-semester classification (<http://www.registrar.psu.edu/enrollment/semester-classification.cfm>).

READ SENATE POLICY 37-30: ENTRANCE TO AND CHANGES IN MAJOR PROGRAMS OF STUDY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/37-00-entrance-to-a-college-or-major/>)

## Degree Requirements

For the Bachelor of Science degree in Structural Design and Construction Engineering Technology, a minimum of 125 credits is required:

| Requirement                | Credits |
|----------------------------|---------|
| General Education          | 45      |
| Electives                  | 2-10    |
| Requirements for the Major | 95-102  |

**20-24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 3 credits of GWS courses; 3 credits of GHW courses.**

### General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

### Foundations (grade of C or better is required.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

### Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

### Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 6 credits

## University Degree Requirements

### First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

### Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

### Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

### Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

### Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

### Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

### Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

### Common Requirements for the Major (All Options)

| Code  | Title   | Credits |
|---|---|---------|
| <b>Prescribed Courses</b>                                 |   |         |
| CET 308   | Construction Methods and Materials                    | 3       |
| CET 342   | Civil Engineering Materials - Concrete and Bituminous | 3       |
| CET 343   | Soils Mechanics                                       | 3       |
| CET 434   | Foundations   | 3       |
| CHEM 110  | Chemical Principles I                                 | 3       |
| CHEM 111  | Experimental Chemistry I                              | 1       |
| ENGL 202C   | Effective Writing: Technical Writing                  | 3       |
| ET 200  | Graphic Communications                                | 3       |
| MATH 140  | Calculus With Analytic Geometry I                     | 4       |
| SSET 295  | Internship  | 1       |
| <i>Prescribed Courses: Require a grade of C or better</i> |   |         |
| CE 254  | Personal & Occupational Safety                        | 3       |
| CE 333W   | Construction Management I                             | 3       |
| CET 430   | Structural Analysis                                   | 3       |
| CET 431   | Structural Design-Steel                               | 3       |
| CET 432   | Structural Design-Reinforced Concrete                 | 3       |
| CET 435   | Construction Estimating                               | 3       |

### Additional Courses

|                              |   |     |
|------------------------------|---|-----|
| CE 310                       | Surveying   | 3   |
| or SUR 111                   | Plane Surveying   |     |
| EGT 101                      | and Introduction to Computer Aided Drafting             | 2-3 |
| & EGT 102                    |   |     |
| or EDSGN 100                 | Cornerstone Engineering Design                          |     |
| ET 323                       | Strength of Materials Laboratory                        | 1   |
| or MET 214                   | Strength and Properties of Materials Laboratory         |     |
| MATH 141                     | Calculus with Analytic Geometry II                      | 4   |
| or STAT 200                  | Elementary Statistics                                   |     |
| Select one of the following: |   | 3-4 |
| PHYS 150                     | Technical Physics I                                     |     |
| PHYS 211                     | General Physics: Mechanics                              |     |
| PHYS 250                     | Introductory Physics I                                  |     |
| Select one of the following: |   | 3-4 |
| PHYS 151                     | Technical Physics II                                    |     |
| PHYS 212                     | General Physics: Electricity and Magnetism              |     |
| PHYS 251                     | Introductory Physics II                                 |     |
| Select one of the following: |   | 3   |
| ECON 14                      | Principles of Economics                                 |     |
| ECON 102                     | Introductory Microeconomic Analysis and Policy          |     |
| ECON 104                     | Introductory Macroeconomic Analysis and Policy          |     |
| Select one of the following: |   | 3   |
| CMPSC 101                    | Introduction to Programming                             |     |
| CMPSC 121                    | Introduction to Programming Techniques                  |     |
| CMPSC 201                    | Programming for Engineers with C++                      |     |
| CMPSC 202                    |   |     |
| Select one of the following: |   | 3-4 |
| ACCTG 211                    | Financial and Managerial Accounting for Decision Making |     |
| MGMT 100                     | Survey of Management                                    |     |
| MGMT 301                     | Basic Management Concepts                               |     |

*Additional Courses: Require a grade of C or better*

|                              |  |   |
|------------------------------|--|---|
| Select one of the following: |  | 3 |
| EMCH 211                     | Statics  |   |
| ET 300                       | Mechanics I: Statics (does not require a grade of C or better) |   |
| MET 111                      | Mechanics for Technology: Statics                              |   |
| Select one of the following: |  | 3 |
| EMCH 213                     | Strength of Materials  |   |
| ET 322                       | Strength of Materials  |   |
| MET 213                      | Strength and Properties of Materials                           |   |

### Requirements for the Option

Select an option 19-22

### Requirements for the Option Construction Management Option (19-21 credits)

| Code  | Title                           | Credits |
|---|---------------------------------|---------|
| <b>Prescribed Courses</b>                                 |                                 |         |
| <i>Prescribed Courses: Require a grade of C or better</i> |                                 |         |
| CE 456  | Planning and Scheduling         | 3       |
| CE 458  | Construction Management II      | 3       |
| CE 488C   | Capstone Project - Construction | 4       |

**Additional Courses**

Select one of the following: 3-4

|           |   |  |
|-----------|---|--|
| ACCTG 211 | Financial and Managerial Accounting for Decision Making |  |
| MGMT 100  | Survey of Management                                    |  |
| MGMT 301  | Basic Management Concepts                               |  |

Select one of the following: 3

|          |  |  |
|----------|--|--|
| AE 310   | Fundamentals of Heating, Ventilating, and Air Conditioning |  |
| CE 321   | Highway Engineering  |  |
| ENVE 430 | Sustainable Engineering                                    |  |
| MET 435  | Building Energy Systems                                    |  |

**Supporting Courses and Related Areas**

Select 3-4 credits from approved program list 3-4

**Structural Design Option (19-20 credits)**

Code Title Credits

**Prescribed Courses**

EMCH 212 Dynamics 3

*Prescribed Courses: Require a grade of C or better*

CE 445 Advanced Structural Analysis 3

CE 449 Advanced Structural Design 3

CE 488D Capstone Project - Structural Design 4

**Additional Courses**

CET 361 Fluid Flow 3

or CE 360 Fluid Mechanics

**Supporting Courses and Related Areas**

Select 3-4 credits from approved program list 3-4

**General Option (22 credits)**

Code Title Credits

**Prescribed Courses***Prescribed Courses: Require a grade of C or better*

CE 445 Advanced Structural Analysis 3

CE 449 Advanced Structural Design 3

CE 456 Planning and Scheduling 3

CE 458 Construction Management II 3

**Additional Courses**

AE 310 Fundamentals of Heating, Ventilating, and Air Conditioning 3

or MET 435 Building Energy Systems

CE 360 Fluid Mechanics 3

or CET 361 Fluid Flow

*Additional Courses: Require a grade of C or better*

CE 488C Capstone Project - Construction 4

or CE 488D Capstone Project - Structural Design

**Academic Advising**

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

**Harrisburg****Seroj Mackertich, Ph.D.**

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**Suggested Academic Plan**

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2020-21 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

**Harrisburg Campus**

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

**First Year**

| Fall                       | Credits Spring                       | Credits |
|----------------------------|--------------------------------------|---------|
| ENGL 15 or 30 <sup>†</sup> | 3 General Education Course           | 3       |
| EDSGN 100 or 100S          | 3 ECON 102 or 104 <sup>†</sup>       | 3       |
| CE 100S                    | 1 CAS 100 <sup>†</sup>               | 3       |
| MATH 41                    | 3 PHYS 150, 211, or 250 <sup>†</sup> | 3-4     |
| CHEM 110 <sup>†</sup>      | 3 MATH 140 <sup>†</sup>              | 4       |
| CHEM 111 <sup>†</sup>      | 1                                    |         |
| General Education Course   | 3                                    |         |
|                            | 17                                   | 16-17   |

**Second Year**

| Fall                               | Credits Spring                    | Credits |
|------------------------------------|-----------------------------------|---------|
| General Education Course           | 3 General Education Course        | 3       |
| PHYS 151, 212, or 251 <sup>†</sup> | 3-4 CMPSC 101, 121, 200, or 201   | 3       |
| MATH 141 or STAT 200 <sup>†</sup>  | 4 ENGL 202C <sup>†</sup>          | 3       |
| ET 300 or EMCH 211 <sup>*</sup>    | 3 ET 322 or EMCH 213 <sup>*</sup> | 3       |
| ACCTG 211 or MGMT 301              | 3-4 ET 323                        | 1       |
|                                    | General Education Course          | 3       |
|                                    | 16-18                             | 16      |

**Third Year**

| Fall                        | Credits Spring                                     | Credits |
|-----------------------------|--|---------|
| ET 200                      | 3 CET 343  | 3       |
| CE 333W <sup>*†</sup>       | 3 CET 308  | 3       |
| CET 342                     | 3 CET 435 <sup>*</sup>                             | 3       |
| ET 321 (or (S)(G) EMCH 212) | 3 (S) (G) CET 361 or (C) ACCTG 211 or (C) MGMT 301 | 3-4     |
| SUR 111 or CE 310           | 3 CET 430 <sup>*</sup>                             | 3       |
|                             | SSET 295   | 1       |
|                             | 15   | 16-17   |

**Fourth Year**

| Fall  | Credits Spring  | Credits |
|---|---|---------|
| CET 431 <sup>*</sup>                        | 3 CET 434   | 3       |
| CET 432 <sup>*</sup>                        | 3 (C) (G) CE 321 Highway Engineering or (C) (G) MET 435 Building Energy Systems or (C) (G) ENVE 430 Sustainable Engineering | 3       |
| CE 254 <sup>*†</sup>                        | 3 (S) (G) CE 480D Capstone Project: Structural Design or (C) CE 488C Capstone Project: Construction <sup>*</sup>            | 3       |
| (C) (G) CE 456 <sup>*</sup>                 | 3 (S) (G) CE 445 Advanced Structural Analysis <sup>*</sup>  | 3       |
| (S) (G) CE 488D or (C) CE 488C <sup>*</sup> | 1 (S) (G) CE 449 Advanced Structural Design <sup>*</sup>  | 3       |
| (C) (S) Approved Slection                   | 3 (C) (G) CE 458 Construction Management <sup>*</sup>   | 3       |
|   | 16  | 18      |

Total Credits 130-134

- \* Course requires a grade of C or better for the major  
 ‡ Course requires a grade of C or better for General Education  
 # Course is an Entrance to Major requirement  
 † Course satisfies General Education and degree requirement  
<sup>1</sup> (C) (S) Approved Selection  
 Choose from the Approved Selection list.

**University Requirements and General Education Notes:**

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

**Advising Notes:**

Students must complete an option in one of the following areas: Construction (C), Structural Design (S), or General (G).

**Program Notes:**

- Students must complete a 3-credit course in "United States Cultures (US)" and a 3-credit course in "International Cultures (IL)."
- Entrance into SDCET major require a minimum of 29.1 credits and a 2.0 GPA.
- Graduation in this major: Courses listed with an \* requires a grade of C or better and an option area.
- SDCET Approved Selections
- Other engineering or business courses may be accepted with permission of the program chair.
- An option-required courses cannot be used for an Approved Selection

**List of Approved Courses**

- ACCTG 211 FINANCIAL ACCOUNTING
- MET 435 HVAC
- B LAW 243 (4) or B LAW 242 and 241 (2) (2) LEGAL ENVIRONMENT BUSINESS
- CET 361 FLUID FLOW
- C E 321 HIGHWAY ENGINEERING
- C E 424 PROJECT INFORMATION MODELING
- C E 445 ADVANCED STRUCTURAL ANALYSIS
- C E 449 ADVANCED STRUCTURAL DESIGN
- C E 456 PLANNING & SCHEDULING
- C E 458 CONSTRUCTION MANAGEMENT II
- ENVE 415 HYDROLOGY
- ENVE 430 SUSTAINABLE ENGINEERING
- EET 320 INDUSTRIAL ELECTRICITY and ELECTRONICS
- ET 495 INTERNSHIP
- E MCH 212/MET 321 DYNAMICS
- MET 435 BUILDING ENERGY SYSTEMS
- M E 201 INTRODUCTION TO THERMAL SCIENCE
- M E 300 ENGINEERING THERMODYNAMICS
- MGMT 301 BASIC MGMT CONCEPT

**Career Paths**

The SDCET program is designed to prepare students for careers in the highly specialized construction industry. It allows for flexible scheduling, enabling students to focus their specialization in either construction or design. Study through these options could lead to opportunities as structural designers for bridges, buildings, or other projects or as project managers for commercial construction projects. Career options may also be available in government for state and federal highway projects and with construction firms in the specialty areas of scheduling, estimating, and cost control. Finally, opportunities may exist for graduates to pursue opportunities as designers, owners, or contractor representatives.

**Careers**

The U.S. Bureau of Labor Statistics expects excellent employment opportunities in the construction industry for the coming years. Penn State Harrisburg graduates in Structural Design and Construction Engineering Technology have had impressive job placements in the last eight years.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE STRUCTURAL DESIGN AND CONSTRUCTION ENGINEERING TECHNOLOGY PROGRAM (<https://harrisburg.psu.edu/science-engineering-technology/civil-structural-engineering/bachelor-science-structural-design-and-construction-engineering-technology/>)

## Professional Resources

- American Concrete Institute (<https://www.concrete.org/students.aspx>)
- American Institute of Constructors (<http://www.professionalconstructor.org/>)
- American Institute of Steel Constructors (<https://www.aisc.org/>)
- American Society of Civil Engineers (<http://www.asce.org/join/>)

## Accreditation

The Bachelor of Science in Structural Design and Construction Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET.

MORE INFORMATION ABOUT ABET ACCREDITATION (<http://www.abet.org/>)

## Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (<https://psu.edu/state-licensure-disclosures/>) interactive map.

## Contact

### Harrisburg

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<http://harrisburg.psu.edu/science-engineering-technology/civil-structural-engineering/bachelor-science-structural-design-and-construction-engineering-technology> (<http://harrisburg.psu.edu/science-engineering-technology/civil-structural-engineering/bachelor-science-structural-design-and-construction-engineering-technology/>)