

Course Number and Title: CET 135 Engineering Materials

Campus Location:

Georgetown, Dover, Stanton

Effective Date:

2022-51

Prerequisite:

SSC 100 or concurrent

Co-Requisites:

none

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course introduces construction materials and methods of use as they relate to the overall engineering and building industry. Included are soils, aggregates, asphalt, asphalt paving products, Portland cement, Portland cement concrete, masonry, steel, non-ferrous metals, lumber, timber, and finishing materials. Laboratory testing and investigation of the materials are included.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

Hard hat, level 3 safety vest, safety glasses

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Describe the roles and phases of the construction process. (CCC 1, 2, 4; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
2. Describe the properties and behaviors of common construction materials. (CCC 1, 2, 4; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
3. Describe soil properties and their impact on site engineering and building construction. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
4. Identify the application and uses of fine and coarse aggregates. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
5. Describe the properties and uses of asphalt and asphalt pavement materials. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
6. Discuss concrete and the properties of concrete products. (CCC 1, 2, 4, 6; PGC: CET 1, 2, 3, 4, 5; SET 1, 2, 3, 4, 6)
7. Discuss the properties and uses of masonry products. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
8. Discuss the properties and uses of common metals used in construction. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
9. Identify the properties of wood products and systems. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
10. Identify common materials and methods used in building and site construction. (CCC 1, 2, 4, 6; PGC: CET 1, 3, 4, 5; SET 1, 3, 4, 6)
11. Demonstrate professional and ethical conduct as expected in industry. (CCC 1, 2, 3, 4; PGC: CET 1, 5; SET 1, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Describe the roles and phases of the construction process.
 1. Describe the site engineering and building delivery process.
 2. Describe specifications and formatting relevant to the industry.
 3. Identify common building and municipal codes that pertain to site engineering and building construction.
2. Describe the properties and behaviors of common construction materials.
 1. Identify the structural elements of a building.
 2. Recognize the various types of loads that can affect a building.
 3. Describe the various structural properties of materials.
 4. Estimate the thermal properties of materials.
 5. Define *sustainability* with regard to site engineering and building construction.
 6. List various factors that determine the sustainability of materials.
3. Describe soil properties and their impact on site engineering and building construction.
 1. Describe surface investigation and subsurface investigation of a site.
 2. Identify different classification of soil and their bearing capacity.
 3. Discuss standard excavation practices.

4. Identify sediment and erosion control processes.
5. Classify a soil using standard industry practices.
4. Identify the application and uses of fine and coarse aggregates.
 1. Identify fine and coarse aggregates.
 2. Demonstrate an aggregate gradation test using standard industry practices
 3. Discuss the properties of aggregates for various construction applications.
5. Describe the properties and uses of asphalt and asphalt pavement materials.
 1. Identify the various uses of asphalt.
 2. Describe the different types of asphalt.
 3. Identify the asphalt classification system.
 4. Discuss the asphalt construction process.
 5. Estimate an asphalt mix design.
6. Discuss concrete and the properties of concrete products.
 1. List types of concrete.
 2. Discuss where each type of concrete would be used in construction.
 3. Identify the different types of concrete foundation systems.
 4. Discuss the various applications of footings, foundation walls, piles, slabs, and reinforcement.
 5. Discuss the process of damp proofing and dewatering.
 6. Identify the use of concrete in drainage systems.
 7. Describe the manufacturing of cement.
 8. Discuss the chemical composition of Portland cement.
 9. Discuss the physical properties of Portland cement.
 10. Estimate a concrete mix design.
 11. Demonstrate common standard industry tests for concrete.
7. Discuss the properties and uses of masonry products.
 1. Discuss the physical properties of masonry products.
 2. Discuss the types of clay masonry products.
 3. Discuss the types of concrete masonry products.
 4. Discuss the types of natural stone used in construction.
 5. Discuss the application of reinforcement in masonry.
8. Discuss the properties and uses of common metals used in construction.
 1. List the major types of ferrous and nonferrous metals used in construction.
 2. Discuss the various methods of producing steel.
 3. Discuss common structural steel shapes, including dimensions and weights.
 4. Discuss common metal pipes used in drainage and utility systems.
 5. Identify common fastening methods used with ferrous metals.
 6. Identify common industrial tests for metal.
 7. Discuss the physical properties of steel products.
9. Identify the properties of wood products and systems.
 1. Describe the different types of wood products.
 2. Describe the classification of lumber.
 3. Describe lumber production as it relates to its classification and use.
 4. Explain nominal and actual size, and list common lumber sizes.
 5. Identify post and beam, balloon, and western framing construction techniques.
 6. Identify the parts and materials used in stairway construction.
 7. Identify the types and purpose of wood structural members.
 8. Describe common industrial tests for wood.
 9. Determine the strength of lumber by using span tables.
 10. Produce a typical wall section.
10. Identify common materials and methods used in building and site construction.
 1. Identify common roof styles in both residential and commercial building applications.
 2. Describe common roofing materials as they relate to specific roof styles.
 3. Describe common siding materials in both residential and commercial building applications.
 4. Describe common types of windows and exterior doors.
 5. Describe interior finishing materials and how they are installed.
 6. List types of insulation, and explain R-values.
 7. Identify common erosion and sediment control materials and methods.
11. Demonstrate professional and ethical conduct as expected in industry.
 1. Identify common site and industry safety standards.
 2. Identify the need for self-discipline and time management in technical industries.
 3. Communicate and function effectively as a team.

Evaluation Criteria/Policies:

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:

Calculated using the following weighted average

Evaluation Measure	Grade Break-out
Summative: 4 Exams (weighted equally)	40%
Summative: Final Project	10%
Formative: Assessments (Quizzes, Readings, Labs, Journals, Participation, etc.)	50%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**CETAASCET:**

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering activities including, but not limited to site development, hydraulics and hydrology, grading, and structural systems.
2. Conduct standardized field and laboratory testing on civil engineering materials.
3. Select appropriate materials and estimate material quantities for technical projects.
4. Use graphic techniques and productivity software to produce engineering documents.
5. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.

CETAASSET:

1. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities, including but not limited to site development, hydraulics and hydrology, grading, and structural systems.
2. Conduct standardized field and laboratory testing on civil engineering project materials.
3. Select appropriate materials and estimate material quantities for technical projects.
4. Use graphic techniques and productivity software to produce engineering documents.
5. Integrate appropriate surveying methods for land measurement and/or construction layout and the acquisition of spatial data in accordance with the laws and regulations pertaining to Professional Land Surveying.
6. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.