



Course Number and Title: CET 225 – Civil CAD Applications

Campus Location:
Georgetown, Stanton

Effective Date:
2018-52

Prerequisite:
ENG 101, CET 125, EDD 171, MAT 180, CET 247 or concurrent

Co-Requisites:
None

Course Credits and Hours:
3.00 credits
2.00 lecture hours/week
3.00 lab hours/week

Course Description:

This course provides advanced computer aided drafting and design (CADD) practices encountered in the civil engineering field. Topics include topographic survey and analysis, residential lot layout, street layout, profiles and sections, utility layout and profiles, and grading and structural applications. Students receive a working knowledge in civil CADD site modeling and surveying applications.

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:
None

Schedule Type:
Classroom Course
Hybrid Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Initiate civil CADD files with appropriate software and appropriate values for all settings. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
2. Develop data-driven CADD drawings using various forms of survey and design data. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 5, 6)
3. Design and develop a residential subdivision plan. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
4. Design and analyze the vertical elements of a road. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
5. Develop surface models from survey data and 3D linework, objects, road profile, and sections. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
6. Calculate critical design elevations for proposed drainage and utilities such as storm sewer, sanitary sewer, and water service. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
7. Produce structural steel framing and connection detail drawings. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 4, 6)
8. Demonstrate professional and ethical conduct as expected in industry. (CCC 1, 2, 3, 4, 5, 6; PGC: CET 1, 4, 5; SET 1, 3, 4, 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. Initiate civil CADD files with appropriate software and appropriate values for all settings.
 1. Identify the need for various CADD applications (e.g., AutoCAD, Land Enabled Map, Land Desktop, Civil 3D and InRoads, and SurvCAD), the components of each, and how they interact with each other.
 2. Set up drawing files with correct project and drawing paths, units, precision, horizontal and vertical scales, geodetic zones, and orientation.
 3. Identify and activate menus specific to each program's functionality.
 4. Explain the different methods of data sharing between CADD programs.
2. Develop data-driven CADD drawings using various forms of survey and design data.
 1. Describe horizontal datums, why they vary from deed to deed, and the implications of defining an incorrect geographic coordinate system in CADD programs.
 2. Import a survey point file into a global coordinate system, and create a user coordinate system.
 3. Create, delete, modify, and manage the definition and appearance of point objects.
 4. Draw a traverse from survey data or from given northing and easting information.
 5. Plot a drawing using a written deed description.
 6. Draw an appropriate magnetic declination line to describe the difference between magnetic north and true north.
 7. Create common survey and design plans with appropriate elements and layout such as topographic survey and record plan.
3. Design and develop a residential subdivision plan.
 1. Integrate a subdivision layout, including best practices for lot lines, right-of-way, and road centerline design considerations.
 2. Use CADD to create data definitions for design elements such as parcels and road alignment.
 3. Create, apply, and edit tags, labels, and tables for lot lines and curves.
 4. Create a record plan.
4. Design and analyze the vertical elements of a road.
 1. Employ the use of American Association of State Highway and Transportation Officials (AASHTO) road design manuals to determine the optimum vertical road layout with respect to common considerations, such as road classification, design speed, passing sight distance, and stopping sight distance.
 2. Calculate vertical curve elements, such as low point, high point, K-value, and curve length.
 3. Create and label existing and proposed road profiles with CADD.
 4. Create and label typical and actual road cross sections with CADD.
 5. Use CADD profile commands to manipulate tangents and vertical curves for various design considerations.
 6. Create common survey and design plans with appropriate elements and layout such as road plan and profile.
5. Develop surface models from survey data and 3D linework, objects, road profile, and sections.
 1. Describe the process of triangulation to interpolate contours and the data used to triangulate.
 2. Illustrate the various methods of creating 3D surface models for design and analysis.
 3. Create proposed roadway surface model data from a proposed road profile.
 4. Analyze existing and proposed surface data to develop optimum design elevations for critical site elements, such as parking grades, Americans with Disabilities Act (ADA) accessible grades, intersections, and ponds.
 5. Create 3D linework, grading objects, and design points.
 6. Compute slopes and create contours.
 7. Create common survey and design plans with appropriate elements and layout, such as grading plan and road plan and profile.
6. Calculate critical design elevations for proposed drainage and utilities such as storm sewer, sanitary sewer, and water service.
 1. Develop a functional utility layout.
 2. Calculate pipe design elevations such as slopes, inverts, cover, and clearance.
 3. Create, label, and edit utility profiles.
 4. Create common survey and design plans with appropriate elements and layout such as utility plan and profile.
7. Produce structural steel framing and connection detail drawings.
 1. Define *structural drafting* and the different types of structural drawings.
 2. Explain the drawing, checking, correcting, and revising process in structural drafting.
 3. Explain the product fabrication processes for structural steel.
 4. Describe, designate, and illustrate the various structural steel products used in framing plans.
 5. Properly use the American Institute of Steel Construction's *Manual of Steel Construction* for determining structural steel product designations and dimensions.
 6. Construct structural steel framing plans, and complete structural steel baseplate, framed, and/or seated connections according to engineering specifications.
8. Demonstrate professional and ethical conduct as expected in industry.
 1. Identify the need for self-discipline and time management in technical industries.
 2. Communicate and function effectively as a member of a team.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	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	Percentage of final grade
Formative Assessments (participation, homework, discussion boards, etc.)	25%
Summative: Site Layout and Record Plan, Road Plan and Profile, Existing Conditions Plan, Grading Plan, Structural Steel Framing Plan w/Connection Detail	75%
Final Course Grade	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 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. 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.