

Mercer County Community College

Arts, Communication and Engineering Technology Division

CIV 220 SPRING 2009

CAD Applications in Civil/Surveying Technology

COURSE DESCRIPTION:

Use of civil and surveying software within the AutoCAD drafting package. Projects involve topographic maps, areas and volumes of cross-sections, plan and profile of highways, subdivisions, digitizing, horizontal and special curve problems, coordinate computations in traversing, intersections and possibly transformations.

Text (s): **Reference Division Booklist**

Prerequisites: **CIV102, DRA190 or permission of instructor**

Corequisites:

Credits: **3** Lecture Hours: **2** Studio/Lab Hours: **3**

Course Coordinator: **John Santosusso**

Latest Review: **2009**

General Objectives:

1. Four Land Development Manuals will be used to aid in completing various civil and surveying drawing projects that will be plotted using AUTO-CAD Software and the IBM (compatible) Micro computers. Some handouts will be supplied by instructor.
2. To have the students use their surveying skills obtained in previous surveying courses to solve and plot engineering and surveying problems.
3. The students will use total-station theodolites (and Data Collectors) to obtain topographic data.

Evaluation:

Midterm	15%
Final Exam	15%
Projects	60%
Attendance and Participation	10%

Each student is also required to purchase:

- (a) 2 - 3 1/2 High Density Floppy Disks
- (b) 1 – Flash Drive

UNIT I: (6 weeks) COGO AND SURVEY MODULES

The COGO module will allow the student to work towards producing a final plan as he/she designs. Among some of the COGO features are:

- Automatic Labeling of Bearings, Distances and Curve Data
- Automatic Point Numbering
- Point and Datum Editing
- Rotation and Translation of Coordinates
- Special Lines including Treelines, Railroad Tracks, Stone Walls, etc.
- Area Calculations by entity or point selection
- Curve Solver
- Typical Symbols

The COGO menu is divided into the following sections:

- SETUPS
- POINTS
- AREAS
- LINES
- CURVES
- SPECIAL LINES
- LABELS
- LISTINGS
- NOTES
- DETAILS
- TOOL BOX

Among some of the INPUT and REDUCTION features are:

- Traverse entry
- Balancing of closed traverses
- Sideshot entry
- Importing of external point files
- Exporting of point information

The SURVEY Module will also be covered.

The student will use these modules and other DCA modules to solve surveying and engineering problems involved with:

1. Coordinate computations in boundary measurements
2. Areas of parcels including areas with circular boundaries
3. Horizontal curves
4. Vertical curves
5. Intersections of
 - a. Lines
 - b. Lines and Arcs
 - c. Arcs and Arcs
6. Two-Dimensional conformal coordinate transformation
7. Special curve problems
8. Digitizing
9. Traversing and Radial Stakeout computations

UNIT II (4 weeks) DESIGN MODULE

The DESIGN module will allow the student to work towards producing a final plan as he/she designs. Among some of the DESIGN features are:

- Stationing and Multiple Offsets
- Cul-de-sacs and Intersection
- Existing Ground Profile Generation
- Vertical Curve Calculations
- Calculates and Labels Finished Grades
- Predefined Areas and Parking Lot Layout

The DESIGN menu is divided into the following sections:

- SETUP
- ALIGNMENT
- OFFSETS
- STATION
- CUL-DE-SAC
- INTERSECTIONS
- PROFILE
- CROSS-SECTIONS
- SEWAGE AND DRAINAGE PIPES
- LOT SIZING
- PARKING STALLS

The student will use this and other DCA modules to solve surveying and engineering problems involved with:

1. Highway - Plan and Profiles
2. Urban and Highway - Intersections
3. Subdivision of larger parcels of lands

UNIT III (5 weeks) DIGITAL TERRAIN MODELING (DTM) AND EARTHWORKS MODULES

The DTM and EARTHWORKS modules allows the student to work toward producing a final plan as he/she designs. Among some of the DTM features are:

- Digital Terrain Modeling from field points or contours
- Interactive Edit of the DTM (digital terrain model)
- Generation of contours from the DTM (digital terrain model)
- Highlighting and Labeling of Contours
- Creation of a Three-dimensional Grid with Projection of lines and Arcs
- Automated Cross-sections and Profiles when used with DESIGN

Among some of the EARTHWORKS features are:

- Multiple Surface Analysis
- Full and Partial Site Analysis
- Report Generation
- Proposed Surface Generation from Contours
- Grading Macros
- Daylight and Cut/Fill Contour Line Output

The DTM screen menu is divided into the following sections:

- SETUP
- POINTS
- T.I.N.
- CONTOURS
- 3DGRID
- SECTION

The student will, using these and other DCA Modules:

1. Plot a topographic map from:
 - a) Existing Topographic Map Data
 - b) Field Data - Obtained using total station instruments and data collector
2. Compute areas of various cross sections of a proposed highway and/or site plan.
3. Compute the volume of EARTH needed for a proposed highway and/or site plan.
4. Design the final volumes after recomputing the finished grades and taking into consideration the quantity, direction, and distance hauled. He may use a mass diagram to solve this problem.
5. Plot final plan, profile, and cross sections for the problems above.

Academic Integrity Statement: Students are expected to comply with the college-wide requirements for academic integrity. Mercer County Community College is committed to Academic Integrity—the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work. Presenting another individual’s work as one’s own and receiving excessive help from another individual will qualify as a violation of Academic Integrity. The entire policy on Academic Integrity is located in the Student handbook and is found on the college website (http://www.mccc.edu/admissions_policies_integrity.shtml).

Students with Disabilities

Any student in this class who has special needs because of a disability is entitled to receive accommodations. Eligible students at Mercer County Community College are assured services under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973.

If you believe you are eligible for services, please contact Arlene Stinson, the Director of Academic Support Services. Ms. Stinson’s office is LB216, and she can be reached at (609) 570-3525.