Course Number & Name: ENR 105 Applied Computer-Aided Design

Credit Hours: 2.0   Contact Hours: 3.0   Lecture: 1.0   Lab: 2.0   Other: N/A

Prerequisites: Grade of “C” or better in ENR 103

Co-requisites: None   Concurrent Courses: None

Course Outline Revision Date: Fall 2010

Course Description: This first course in Computer-Aided Design (CAD) uses the latest release of AutoCAD software. Students are introduced to the terminology, use, and capabilities of CAD. Through hands-on instruction, students learn to complete projects using the latest hardware and software. After starting with the beginning draw and edit commands, the course proceeds to cover tolerance dimensioning, printing, the creation of symbols libraries, isometric rendering, three dimensional wire-frame modeling, and blocks with attributes.

Course Goals: Upon successful completion of this course, students should be able to do the following:

1. set up drawings (blueprints) within a CAD system (namely AutoCAD) from different disciplines (e.g., mechanical, architectural, civil, etc.);
2. utilize the Draw and Modify tools of AutoCAD to construct and modify different geometries;
3. employ dimensioning tools of AutoCAD to add dimensions and/or tolerances (for mechanical design applications) to the blueprint;
4. apply the Hatch command in drawings involving sectional views to highlight interior complexities of the design;
5. employ the Layer command in organizing the drawing according to the different categories of elements present in the design document;
6. build a library of symbols and employ existing symbols in electrical, architectural, mechanical and other applications; and
7. communicate with other members of the technical team through using the acceptable industry standards (i.e., ANSI and/or other applicable industry standards).
Measurable Course Performance Objectives (MPOs): Upon successful completion of this course, students should specifically be able to do the following:

1. Set up drawings (blueprints) within a CAD system (namely AutoCAD) from different disciplines (e.g., mechanical, architectural, civil, etc.):
   1.1 determine the units of the drawing;
   1.2 decide on the drawing scale; and
   1.3 set up template files for different disciplines and demonstrate their reuse

2. Utilize the Draw and Modify tools of AutoCAD to construct and modify different geometries:
   2.1 execute the Draw and Modify tools efficiently; and
   2.2 employ the Draw and Modify tools to complete a drawing

3. Employ dimensioning tools of AutoCAD to add dimensions and/or tolerances (for mechanical design applications) to the blueprint:
   3.1 determine the dimensioning variables pertinent to the current drawing;
   3.2 set the dimensioning variables to achieve a particular dimension appearance; and
   3.3 use the dimensioning variables to add tolerances to the dimensions in a mechanical design drawing

4. Apply the Hatch command in drawings involving sectional views to highlight interior complexities of the design:
   4.1 select the relevant option(s) available under the Hatch command; and
   4.2 employ the Hatch command to complete drawings with sectional views

5. Employ the Layer command in organizing the drawing according to the different categories of elements present in the design document:
   5.1 create new layers with different attributes using the Layer command;
   5.2 place elements on the current layer and move elements from one layer to another; and
   5.3 utilize the Layer command as a drawing organizing tool

6. Build a library of symbols and employ existing symbols in electrical, architectural, mechanical and other applications:
   6.1 create blocks and place them in a library file; and
   6.2 import the blocks in the library to other drawings and use them as well as existing symbols to complete a design work

7. Communicate with other members of the technical team through using the acceptable industry standards (i.e., ANSI and/or other applicable industry standards):
   7.1 complete blueprints according to the ANSI/industry standards; and
   7.2 employ dimensioning and annotation techniques consistent with industry standards
Methods of Instruction: Instruction will consist of lectures, demonstrations, and the independent completion of weekly projects.

Outcomes Assessment: Test and exam questions are blueprinted to course objectives. Checklist rubrics are used to evaluate the projects and portfolio for the presence of the course objectives. Data is collected and analyzed to determine the level of student performance on these assessment instruments in regards to meeting course objectives. The results of this data analysis are used to guide necessary pedagogical and/or curricular revisions.

Course Requirements: All students are required to:
1. Maintain regular attendance.
2. Complete assigned homework and weekly projects on time.
3. Take all tests and the final exam as scheduled.

Methods of Evaluation: Final course grades will be computed as follows:

<table>
<thead>
<tr>
<th>Grading Components</th>
<th>% of final course grade</th>
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</thead>
<tbody>
<tr>
<td>• 15 or more Weekly Projects and a Course Portfolio</td>
<td>0 – 20%</td>
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<tr>
<td>The weekly projects and the course portfolio will provide evidence of the extent to which students have mastered and synthesize course material and have met course objectives.</td>
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<tr>
<td>• 2 or more Tests (dates specified by the instructor)</td>
<td>45 – 60%</td>
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<td>Tests will show evidence of the extent to which students have met course objectives.</td>
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<tr>
<td>• Final Exam</td>
<td>25 – 30%</td>
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<td>The final exam will examine the extent to which students are proficient in using AutoCAD and have achieved all course objectives.</td>
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NOTE: The instructor will provide specific weights, which lie in the above-given ranges, for each of the grading components at the beginning of the semester.
**Academic Integrity:** Dishonesty disrupts the search for truth that is inherent in the learning process and so devalues the purpose and the mission of the College. Academic dishonesty includes, but is not limited to, the following:

- plagiarism – the failure to acknowledge another writer’s words or ideas or to give proper credit to sources of information;
- cheating – knowingly obtaining or giving unauthorized information on any test/exam or any other academic assignment;
- interference – any interruption of the academic process that prevents others from the proper engagement in learning or teaching; and
- fraud – any act or instance of willful deceit or trickery.

Violations of academic integrity will be dealt with by imposing appropriate sanctions. Sanctions for acts of academic dishonesty could include the resubmission of an assignment, failure of the test/exam, failure in the course, probation, suspension from the College, and even expulsion from the College.

**Student Code of Conduct:** All students are expected to conduct themselves as responsible and considerate adults who respect the rights of others. Disruptive behavior will not be tolerated. All students are also expected to attend and be on time for all class meetings. No cell phones or similar electronic devices are permitted in class. Please refer to the Essex County College student handbook, *Lifeline*, for more specific information about the College’s Code of Conduct and attendance requirements.
**Course Content Outline:** based on the text *Learning AutoCAD in 15 Projects*, by H Assadipour; published by Yafa Educational; Montclair, NJ, 2010.

<table>
<thead>
<tr>
<th>Class Meeting (80 minutes)</th>
<th>Chapter/Section</th>
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</table>
| 1                          | INTRODUCTION OF COMPUTER-AIDED DESIGN  
                       CAD versus traditional drafting  
                       AutoCAD’s graphical user interface |
| 2                          | POINT COORDINATES SPECIFICATION: ABSOLUTE, RELATIVE  
                       Introduction to Draw & Modify tools & **Project #1** |
| 3                          | GEOMETRIC CONSTRUCTIONS WITH AUTOCAD  
                       Mvsetup command and its options |
| 4                          | ORGANIZING DRAWING THROUGH LAYERS  
                       Creating a drawing with orthographic views & **Project #2** |
| 5                          | USING THE LAYER COMMAND AND DRAWING MANAGEMENT |
| 6                          | ADDING TEXT AND DIMENSIONS TO YOUR DRAWINGS |
| 7                          | INTRODUCING TEXT COMMANDS, PLOTTING & PLOTTING TO SCALE  
                       Customizing the text style & **Project #3** |
| 8                          | INTRODUCTION TO DIMENSIONING  
                       Setting dimension variables and defining a dimension style & **Project #4** |
| 9                          | USING DRAFTING & DESIGN TOOLS |
| 10                         | Running OSNAP, Polar Tracking, Object Tracking and **Project #5** |
| 11                         | MORE ON DRAFTING SETTINGS TOOLS: SNAP, GRID, ORTHO, ETC.  
                       **Test #1** |
| 12                         | HIGHWAY DRAWING/USING CONSTRUCTION LINE  
                       Creating the drawing for a highway with jug-handles for exits/entrances & **Project #6** |
| 13                         | CIVIL/SURVEYING ENGINEERING DRAWING/SET UP FOR SURVEYING  
                       Completing a surveying exercise & **Project #7** |
| 14                         | CONSTRUCTING YOUR OWN TITLE BLOCK  
                       Making your block available to other drawings |
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| 15 | SECTIONING & HATCH COMMAND APPLICATIONS  
Sectional views in mechanical and civil applications & **Project #8** |
| 16 | CREATING BLOCKS & SYMBOLS LIBRARY  
Electrical circuit design using the library of symbols |
| 19 | PRINTED CIRCUIT BOARDS & **Project #9** |
| 20 | MAPPING/SURVEYING DRAWINGS  
**Test #2** |
| 21 | CIVIL ENGINEERING DRAWING & **Project #10** |
| 22 | SURVEYING & MAPPING PROJECTS |
| 23 | MORE ON MAPPING & SURVEYING  
Constructing site plan & **Project #11** |
| 24 | CREATING ARCHITECTURAL FLOOR PLAN USING MULTI-LINES  
Completing floor plan for an office space & **Project #12** |
| 25 | ISOMETRIC DRAWING |
| 26 | Setting up AutoCAD editor for drawing isometric views & **Project #13** |
| 27 | BLOCK WITH ATTRIBUTES & ATTRIBUTE EXTRACTION  
Defining attributes and extracting attribute & **Project #14** |
| 28 | CREATING BILL OF MATERIALS (BOM) USING ATTRIBUTE EXTRACTION PROCESS |
| 29 | CONSTRUCTION OF A FLOOR PLAN/DRAWING MANAGEMENT & **Project #15** |
| 30 | **Final Exam** |