COURSE OUTLINE

Course Number	Course Title	Credits
DRA 238	**Advanced Computer-Aided Design**	**3**

Hours: lecture/Lab/Other 2/2	Pre-requisite DRA 190 or prior experience and permission	Implementation sem/year 2014

Catalog description (2009-2011 Catalog):

DRA 238 - Advanced Computer-Aided Design (3 credits)
Prerequisite: DRA 190
Advanced computer drafting course using CAD software. Includes a review of basic command options, display options, hatching and sectioning, text, and dimensioning. Introduces 3-D drawing and surface modeling. *2 lecture/2 laboratory hours*

Required texts/other materials:

AutoCAD and Its Applications-Advanced
 Author(s): Shumaker, Terence M. **ISBN:** 1-60525-162-2 **Edition / Copyright:** 19th 2015
 Publisher: Goodheart-Wilcox Co.

Revision date: Fall 2021   **Course coordinator:** James Maccariella, maccarij@mccc.edu

Information resources:

Secondary Text: **AutoCAD and Its Applications-Basics**
AUTOCAD (latest edition)
By T. Shumaker and D. Madsen
Publisher: Goodheart-Wilcox

(Textbook from DRA 190)

Other learning resources:

Web site studentautodesk.com

Course Competencies/Goals

The student will be able to:

1. Demonstrate competence in basic Auto Cad commands and drawing.
2. Define and use 3D coordinates and user-defined coordinate systems to aid in the construction of 3D objects.
3. Construct 3D solid and mesh models using the 3D environment.
4. Use a variety of 3D visual style display techniques.
5. Create still views and animated shots of 3D models.
6. Create and use model space viewports.
7. Extract two-dimensional views from a three-dimensional model for detail drafting.
8. Create and edit 3D solid primitives, 3D mesh models, 2D regions, and composite 3D solid models.
9. Display a 3D model using visual style settings.

Course-specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals
Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

MCCC Core Skills
Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
Goal C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.
Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.

Units of study in detail.

Unit I   REVIEW OF AUTOCAD BASICS AND LARGE PROJECT PLANNING
A review of AutoCAD basics as covered in DRA 190 concurrently with large project planning principles, and the production of a large drawing using multiple scales.
Learning Objectives The student will be able to…

- Demonstrate competence in basic Auto Cad commands and 2D drawing and editing.
- Demonstrate an understanding of Drawing Display Options
- Demonstrate an understanding of Layouts, Plotting and Printing
- Demonstrate an understanding of Creating Symbols
- Demonstrate an understanding of External References

Unit II . INTRODUCTION TO AUTOCAD 3D CONSTRUCTION
Learning Objectives The student will be able to…

- Describe the right-hand rule of 3D visualization.
- Display 3D objects from preset isometric viewpoints.
- Display 3D objects from any desired viewpoint.
- Set a visual style current.
- Construct 3D solid primitives.
- Create complex solids using the **UNION** command and Remove portions of a solid using the **SUBTRACT** command.
- Create a new solid from the interference volume between two solids.
- Create mesh primitives, a smoothed mesh object and a refined mesh object.
- Construct mesh forms.
- Generate a mesh, by converting a solid, by converting a surface.

- Generate a surface by converting a mesh. Generate a solid by converting a mesh.
- Execute editing on mesh objects.

Unit III   Viewing and Displaying Three-Dimensional Models

Learning Objectives The student will be able to…

- Use the view cube to dynamically rotate the view a model in 3D space. and display orthographic plan views of all sides on the model.
- Use the visual style options to create face and edge style display variations.
- Render a 3D model.

Unit IV .   Creating and W**orking with Solid Model Details**
Learning Objectives The student will be able to…

- Change properties on solids.
- Rotate and mirror objects in three dimensions.
- Create 3D arrays.
- Fillet and Chamfer solid objects.
- Convert planar objects into surfaces.
- Slice a solid using various methods.
- Construct details on solid models.
- Remove features from solid models.

Unit V.   Sub object and Solid Model Editing

Learning Objectives The student will be able to…

- Select sub objects (faces, edges, and vertices).
- Edit solids using grips.
- Edit face, edge and vertex of subobjects.
- Extrude a closed boundary using the **PRESSPULL** command.
- Extract a wireframe from a 3D solid using the **XEDGES** command.
- Change the shape and configuration of solid object faces.
- Copy and change the color of solid object edges and faces.
- Break apart a composite solid composed of physically separate entities.
- Use the **SOLIDEDIT** command to construct and edit a solid model.

Unit V I.   Solid Model Display and Analysis
Learning Objectives The student will be able to…

- Control the display of solid models.
- Construct a 3D section plane through a solid model.
- Adjust the size and location of section planes.
- Create a dynamic section of a 3D solid model.
- Construct 2D and 3D section blocks.
- Create a flat, 2D projection of a 3D solid model.
- Create a multiview layout of a solid model using **SOLVIEW**and **SOLDRAW**.
- Construct a profile of a solid using **SOLPROF**.
- Perform an analysis of a solid model.
- Export and import solid model data.

<u>Unit V I</u>. **Visual Style Settings and Basic Rendering**

Learning Objectives *The student will be able to…*

- Describe the **Visual Style Manager** palette.
- Change the settings for visual styles.
- Create custom visual styles.
- Export visual styles to a tool palette.
- Render a scene using sunlight.
- Save a rendered image from the **Render** window.
- Attach materials to the objects in a drawing.
- Change the properties of existing materials.
- Create new materials.
- Describe the types of lighting in AutoCAD.
- List the user-created lights available in AutoCAD.
- Change the properties of lights.
- Generate and modify shadows.
- Add a background to your scene and control its appearance.

Evaluation of student learning:

1. <u>**Exercises and Assignments:**</u>
   - Students will complete all assignments as instructed during class and plot final model tab view OR assigned layout tabs on 8-1/2x11 (letter size) paper, as large as possible, unless otherwise instructed.
   - All 3D images will be plotted with the HIDE command, unless otherwise indicated.
   - Assignments will be graded according to accurate completion.
   - Hand in within one week of assignment.
   - Late assignments will be subject to grade reduction of half a letter grade per week.
   - Save all textbook assignments as EX[ChapterNumber]-[ExerciseNumber], i.e. EX10-5, whether or not the assignment tells you to.

2. <u>**Attendance:**</u>
   - Attendance is mandatory unless previously excused (notify instructor prior to missed class). One unexcused absence permitted.
   - Additional unexcused absences will result in a deduction of half a letter grade per instance.

V. 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).

VI. Special Needs Students Statement

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 LB221, and she can be reached at (609) 570-3525.