



# Broward Community College

## Course Outline

STATUS: A

COMMON COURSE NUMBER: EGS 1110C

COURSE TITLE: Engineering Graphics

CREDIT HOURS: 3

### CONTACT HOURS BREAKDOWN:

Lecture/Discussion 48

Lab 48

Other \_\_\_\_\_

Contact Hours/Week 6

### CATALOG COURSE DESCRIPTION:

Prerequisite: MAC 1133

Corequisite: MAC 1034

Graphics as a means of communication for engineers. This is accomplished through sketching, use of instruments, computers (AutoCAD) and knowledge of orthographic projection. Areas of proficiency include drawing to scale, plan reading, construction of auxiliary and sectional views, construction of pictorials, knowledge of accepted practices and an introduction to computer graphics.

General Education Requirements - Associate of Arts Degree, meets Area(s):

General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES: (OVER, PLEASE)

**UNIT TITLES:**

- 1. Tools and Lettering**
- 2. Scales**
- 3. Plane Geometry Review**
- 4. Orthographic Projections**
- 5. Space Geometry and Trigonometry**
- 6. Orthographic Drawings**
- 7. Isometrics**
- 8. Sections**
- 9. Dimensions and Tolerancing**
- 10. True Lengths and Shapes**
- 11. Auxiliary Views**
- 12. Project**

**I. Course Overview:**

Upon successful completion of this course, the students should be able to draw, dimension and annotate general engineering drawings according to professional standards and accuracy.

**II. Units:**

**Unit 1. Tools and Lettering**

General Outcome:

- 1.0 The students should be able to use drafting tools and computer software types of lettering.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 1.1 Identify the different drafting tools machines and computer programs available.
- 1.2 Use triangles, protractors, compasses, French curves, parallel rulers, T-squares, erasers, erasing shields, templates.
- 1.3 Start-up AutoCAD program, create drawing file, recall drawing file.
- 1.4 Identify all the components of the computer equipment required to perform computer assisted drawing.

## **Unit 2. Scales**

### General Outcome:

2.0 The students should be able to use architectural, mechanical, engineering and metric scales.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 2.1 Draw lines to a required scale using the 4 basic scales.
- 2.2 Read dimensions from a given set of lines in all 4 basic scales.
- 2.3 Set-up the AutoCAD file for a required scale.
- 2.4 Understand and use scale factors.
- 2.5 Set-up the AutoCAD file for a given scale.
- 2.6 Set-up the AutoCAD file for its scale.

### **Unit 3. Plane Geometry Review**

#### General Outcome:

- 3.0 The students should be able to understand the geometrical properties in lines, circles, ellipses, parabolas, polygons and hyperbolas.

#### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 3.1 Draw parallel lines using triangles and parallel rulers.
- 3.2 Draw circles and arcs with compass.
- 3.3 Draw angles and triangles using protractors.
- 3.4 Draw tangents to circles, circles tangent to lines and to each other.
- 3.5 Draw ellipses, parabolas and hyperbolas using manual instruments.
- 3.6 Draw all primitives in AutoCAD, including coordinates and osnaps, as well as lines, circles, ellipses.

## Unit 4. Orthographic Projections

### General Outcome:

- 4.0 The students should be able to draw orthographic projections from given isometrics.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 4.1 Develop frontal, horizontal and profile views from given isometrics.
- 4.2 Do free hand sketches of projections using manual instruments.
- 4.3 AutoCAD: Define and Set-up layers, line types, line colors.
- 4.4 Digitize frontal, horizontal and profile views using the AutoCAD program.

## Unit 5. Space Geometry and Trigonometry

### General Outcome:

- 5.0 The students should be able to recognize and use 3-dimensional coordinates, and explain the relationship between lines, planes and solids.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 5.1 Recognize and use trigonometric functions.
- 5.2 Locate points in space using its coordinates.
- 5.3 Locate lines in space using and point coordinates.
- 5.4 Recognize and use lines perpendicular to lines and planes.
- 5.5 Recognize and use line parallel to lines and planes.
- 5.6 Recognize and use planes perpendicular and parallel to planes.
- 5.7 AutoCAD: Three dimensional drafting primitives.

## Unit 6. Orthographic Drawing

### General Outcome:

6.0 The students should be able to draw orthographic drawings using manual and computerized tools (AutoCAD) of objects in space.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 6.1 Develop coordinates from the object in space (isometric given).
- 6.2 Locate points from 1.1 in an orthographic projection (partial, horizontal and profile), using manual tools.
- 6.3 Do the same as 6.1 and 6.2 using the computer (AutoCAD).
- 6.4 Calculate volumes of solids using formulas, as well as surface areas.
- 6.5 Calculate composite object volumes by parts.
- 6.6 Pappus theorems to calculate surfaces and volumes.

## Unit 7. Isometrics

### General Outcome:

- 7.0 The students should be able to draw isometrics from given views, both with hand tools and AutoCAD.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 7.1 Develop three (3) dimensional coordinates from the given projections.
- 7.2 Plot the coordinates into an isometric grid.
- 7.3 Draw the isometric view by connecting points.
- 7.4 Develop isometrics using AutoCAD.
- 7.5 Use display commands in AutoCAD.

## Unit 8. Sections

### General Outcome:

- 8.0 The students should be able to draw full and half sections from given views or isometrics, using hand tools or computer aided drafting.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 8.1 Draw full sections from given isometrics and/or views.
- 8.2 Draw half sections from given isometrics and/or views.
- 8.3 Using AutoCAD, draw full and half sections.

## **Unit 9. Dimensions and Tolerancing**

### General Outcome:

- 9.0 The students should be able to dimension given views with the appropriate tolerance with hand scales or the computer.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 9.1 Dimension a given set of views using hand scales.
- 9.2 Dimension a digitized drawing in AutoCAD using the dimension command.

## Unit 10. True Length and Shapes

### General Outcome:

10.0 The students should be able to recognize and draw true lengths.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 10.1 Classify lines in space according to true lengths.
- 10.2 Draw line views.
- 10.3 Develop true lengths from given line views.
- 10.4 Develop point views from given live views.
- 10.5 Develop edge views of planes from given orthogonal views.
- 10.6 Develop true shapes of triangles from given views.
- 10.7 Do 10.1 thru 10.6 in AutoCAD.

## Unit 11. Auxiliary Views

### General Outcome:

- 11.0 The students should be able to develop auxiliary views of objects in space from given orthogonal views.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 11.1 Develop edge views of given polygons in space.
- 11.2 Draw true shapes of the various surfaces of an object in space by using auxiliary views.
- 11.3 Develop true shapes of surfaces in a solid by using AutoCAD.

## Unit 12. Project

### General Outcome:

- 12.0 The students should be able to develop a project in working drawings for a selected discipline either by hand or digitizing procedures.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 12.1 Recognize all AutoCAD commands required for project.
- 12.2 Select project according to discipline.
- 12.3 Produce a set of drawings for related discipline.