



DDGT 120 - Digital Design Graphics Technology 1 Course Outline

Approval Date: 04/08/2010

Effective Date: 01/16/2018

SECTION A

Unique ID Number CCC000201833

Discipline(s) Drafting

Division Career Education and Workforce Development

Subject Area Digital Design Graphics Technology

Subject Code DDGT

Course Number 120

Course Title Digital Design Graphics Technology 1

TOP Code/SAM Code 0953.00 - Drafting and Design Technology/Technician, General* / C - Occupational

Rationale for adding this course to the curriculum Course needs to be updated.

Units 7

Cross List N/A

Typical Course Weeks 18

Total Instructional Hours

Contact Hours

Lecture 54.00

Lab 216.00

Activity 0.00

Work Experience 0.00

Outside of Class Hours 108.00

Total Contact Hours 270

Total Student Hours 378

Open Entry/Open Exit No

Maximum Enrollment 15

Grading Option Letter Grade Only

**Distance Education Mode of
Instruction**

SECTION B

General Education Information:

SECTION C

Course Description

Repeatability May be repeated 0 times

Catalog The first of a four course series in the Digital Design Graphics Technology A.S.

Description Degree program. This course enables the student to learn and apply the fundamental skills of technical drawing towards the creation of graphical engineering documents per current industry standards. Topics covered include national and international drafting standards, drawing scales, two-dimensional and three-dimensional geometric construction, orthographic projection, auxiliary views, sectioning, dimensioning, external references, creation and modification of templates, computer-aided drafting (CAD), basic reverse engineering of parts, and three-dimensional modeling using the latest version of the Autodesk AutoCAD software.

**Schedule
Description**

SECTION D

Condition on Enrollment

1a. Prerequisite(s): *None*

1b. Corequisite(s): *None*

1c. Recommended

- MACH 100
- TECH 92

1d. Limitation on Enrollment: *None*

SECTION E

Course Outline Information

1. Student Learning Outcomes:

- Obtain Autodesk Certificate of Training
- Ability to implement technical skills in the creation of working drawings utilizing the latest release of the Autodesk AutoCAD software.
- Ability to implement technical skills in the creation of working drawings utilizing the latest release of the Autodesk Inventor Professional software.

2. Course Objectives: Upon completion of this course, the student will be able to:

- Utilize American National Standards Institute (ANSI) and International Standards Organization (ISO) drafting standards.
- Effectively utilize engineering, architecture, and metric scales.
- Understand the components of a CAD workstation and computer hardware components.
- Effectively use the latest release of the AutoCAD software program in a two-dimensional and three-dimensional workspace.
- Utilize drawing aids for entity accuracy.
- Perform various geometric constructions.
- Construct and edit two-dimensional and three-dimensional CAD drawing entities.
- Effectively utilize multiple layers.

- I. Construct multi-view drawings utilizing orthographic projection.
- J. Utilize auxiliary view techniques.
- K. Utilize sectioning techniques.
- L. Represent various fasteners.
- M. Create and modify detailed custom templates to industry standards.
- N. Correctly dimension working detail drawings.
- O. Place and edit detail drawing annotations.
- P. Utilize externally referenced drawing files.
- Q. Print hard copies of various sized detail drawings and rendered three-dimensional models.
- R. Perform efficient Computer-Aided Drafting (CAD) related file management techniques.
- S. Create and modify three-dimensional CAD models.
- T. Produce linear pattern developments of sheet metal pieces.
- U. Create working drawings by reverse engineering simple parts.
- V. Utilize the Windows operating system.
- W.

3. Course Content

- A. Design Visualization
 - a. Drawing Types
 - b. Image Planes
 - c. Design Process
 - d. Advantages of Prototyping
 - e. Advantages of 3D Renderings and Conceptualization
 - f. Types of Views: Oblique, Isometric, and Perspective
 - g. Types of Sketches: Technical, Artistic, Working Drawings
- B. CAD Workstation Components
 - a. Computer Hardware: CPU, Motherboards, Memory, Hard Drives, Video Cards, Power Supplies, ROM
 - b. Computer Software: Operating Systems, GUI
 - c. Input and Output Devices: Monitors, Keyboards, Mice, 3D Mice, Tablets, Digitizers, Printers, Scanners
 - d. Storage Devices: Flash Drives, Servers, NAS, Raid Types
- C. Technical Drawing Tools
 - a. Typical Hand Drafting Tools: T-Squares, Triangles, Drafting Machines, Parallel Arms, Protractors, Erasing Shields, French Curves, Splines, Compasses, and Templates
 - b. Hand Drafting Best Practices
 - c. How to Use and Read Scales: Architectural, Engineering, and Metric
- D. ANSI and ISO Standards
 - a. Line Weights
 - b. Line Types – Alphabet of Lines and Precedence of Lines
 - c. Paper Sizes
 - d. Text Heights, Standards, and Applications
- E. Engineering Geometry and Construction
 - a. 2D Coordinate and 3D Coordinate Systems
 - b. Absolute vs. Relative Coordinates
 - c. World Coordinate System vs. Local Coordinate Systems
 - d. Geometric Terms: Points, Lines, Parallel, Perpendicular, Intersections, Tangency, Circle Definitions, Concentric, Eccentric, Inscribed, Circumscribed,

Classification of Angles, Classification of Quadrilaterals, Polygons, Regular Polygons, Classification of Triangles

- e. Standard Drafting Constructions: How to Bisect a Line, How to Bisect an Angle, How to Find the Center of a Radius, How to Find the Center of a Circle

F. Multiview Drawings

- a. Orthographic Projection and Best Practices
- b. U.S. Standard Third Angle Projection vs. ISO Standard First Angle Projection
- c. Glass Box Method, Plane of Projection, Six Principle Views and the Number of Views Actually Needed
- d. General Layout, Construction Lines, Miter Lines
- e. Representations of Various Types of Machines Holes
- f. Representations of Fillets and Chamfers

G. Auxiliary Views

- a. Descriptions and Applications
- b. Inclined Planes and Oblique Planes
- c. Auxiliary View Classifications: Primary, Secondary, Tertiary
- d. Partial Auxiliary Views vs. Full Auxiliary Views

H. Dimensioning

- a. Dimensioning Terminology, Standards, Applications, Symbology
- b. Size and Location
- c. Types of Dimensioning: Datums, Chain, Baseline, Coordinate
- d. Screw threads and fastener representation
- e. Dual Dimensioning vs. Double Dimensioning
- f. Dimensioning Guidelines

I. Section Views

- a. Definitions and Applications,
- b. Cutting Planes vs. Viewing Planes
- c. Dimension Placement, Alignment, Offset Distances
- d. How to Dimension Standard Hole Types
- e. Standard Protocol: Linetypes, Lineweight, Labels, Hatching, Omitting Lines, How to Deal With Standard Hardware, How to Section Thin and Thick Parts
- f. Types of Sections: Full, Half, Broken, Revolved, Removed, Offset, Assembly, Auxiliary
- g. True Sections vs. Preferred Sections

J. Tolerancing Practices for Both ANSI and ISO

- a. Tolerancing Terminology and Applications
- b. How to Properly Apply Tolerances
- c. Classification of Fits
- d. Tolerance Stack-Up
- e. Surface Symbols

K. Working in Three-Dimensions

- a. Surfaces vs. Solids
- b. Utilizing a Three-Dimensional Interface
- c. 3DCommands
- d. Boolean Operations
- e. Assemblies, Exploded Assemblies

L. Reverse Engineering of Simple Parts

- a. Reverse Engineering Description
- b. Reverse Engineering Tools
- c. Reverse Engineering Application

M. AutoCAD Fundamentals

- a. User Interface
- b. 2D Cartesian Coordinate System
- c. Basic Drawing and Editing Commands
- d. Drawing Precision
- e. Object Modification
- f. Layer Management
- g. Advanced Object Types
- h. Analyzing Model and Object Properties
- i. Advanced Editing Commands
- j. Inserting Blocks
- k. Layouts
- l. Text
- m. Hatching
- n. Adding Dimensions
- o. Working Effectively With AutoCAD
- p. Accurate Positioning
- q. Parametric Drawing
- r. Working With Blocks
- s. Creating Templates
- t. Advanced Layouts
- u. Annotation Styles
- v. External References
- N. Introduction to Designing in a Parametric Environment
 - a. Project Management
 - b. Creation of Linear Pattern Developments of Sheet Metal Pieces
 - c. Creation of Parts, Assemblies, Presentation Views, and Drawings
 - d. Template Creation and Modification
 - e.

4. Methods of Instruction:

Activity: Class assignments.

Lab: Class assignments.

Lecture: Instructor lectures on assigned readings following industry standards and on Autodesk approved courseware.

Observation and Demonstration: Instructor provides computer demonstrations of best practices utilizing the class software for given assignments.

Projects: Class assignments.

Other: Class lectures and demonstrations are recorded and posted online as a student resource.

5. Methods of Evaluation: Describe the general types of evaluations for this course and provide at least two, specific examples.

Typical classroom assessment techniques

Quizzes -- Written exams and quizzes will be given to test student knowledge on software and technical skills. Exams and quizzes will contain short answer, multiple choice, and true and false.

Class Participation -- Students are required to submit reading participation assignments answering questions based on the reading prior to the lecture reviewing the material.

Class Work -- Students may have lab time available during class to work on their homework.

Home Work -- Homework can be found on the assignment list handed out on the first day of class or on the department website. Homework assignments will be submitted one of the following ways: digitally, printed, or require a visual checkoff. Homework assignments will

demonstrate the student's ability to successfully utilize the software and demonstrate the student's skill set.

Final Exam -- Final Exam will be cumulative.

Letter Grade Only

6. Assignments: State the general types of assignments for this course under the following categories and provide at least two specific examples for each section.

A. Reading Assignments

There will be multiple reading assignments out of the class textbook that coincide with the Ascent courseware instruction. Topics may include: design visualization, technical drawing tools, sketching and text, engineering geometry and construction, multiview drawings, auxiliary views, section views, and dimensioning and tolerancing practices.

Usage of Autodesk approved courseware is required under the terms of the Autodesk Training Center agreement. Reading assignments are contained in each individual section of the Autodesk approved courseware licensed from Ascent.

B. Writing Assignments

Students will be given multiple reading participation assignments for assigned chapters out of the class textbook. Questions types will vary but the answers will be available in the reading. Students are to submit their written assignments at the beginning of the class the day that chapter is reviewed.

C. Other Assignments

Students will create a series of drawing files for digital submission or for hard copy printed submission. The assignments will vary in complexity ranging from a simple single view to the printing of working drawings.

Critical thinking to solve drafting problems in CAD.

Students will create a working drawing based of an existing part in a process known as "reverse engineering."

7. Required Materials

A. EXAMPLES of typical college-level textbooks (for degree-applicable courses) or other print materials.

Book #1:

Author: Bertoline, G.,R., Wiebe, E.,N., Hartman, N.,W., Ross, W.,A.

Title: Technical Graphics Communication

Publisher: McGraw-Hill

Date of Publication: 2009

Edition: 4th

Software #1:

Title: AutoCAD

Publisher: Autodesk

Edition: Latest

Software #2:

Title: Inventor

Publisher: Autodesk

Edition: Latest

B. Other required materials/supplies.

- A 3" binder or two 1.5" binders.
- Headphones
- USB Flash Drive