CD240T
Descriptive Geometry
[Onsite]

Course Description:

A study of spatial relations involving points, lines, planes and solids. Instruction includes solving for points and lines of intersections of different geometries and applying analytical graphics to solve design problems.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: CD111T Introduction to Design and Drafting, CD121T Drafting/CAD Methods

Credit hours: 4

Contact hours: 60 (36 Theory Hours, 24 Lab Hours)

SYLLABUS: Descriptive Geometry

Instructor: _____

Office hours: _____

Class hours: _____

MAJOR INSTRUCTIONAL AREAS

Unit 1

Chapter 1

- Introduction to Descriptive Geometry
- Types of Views - 2D
- Orthographic Projection (multiview)
  - First Angle (Standard in Europe)
  - Third Angle (Standard in United States)
  - Constructing a Multiview Drawing
- Axonometric Projections
  - Isometric Projections
  - Isometric Scale
  - Dimetric Projections
  - Trimetric Projections
- Oblique Projections
  - Cavalier Oblique
  - Cabinet Oblique
  - General Oblique

- Perspective Projections
    - One-Point Perspective
    - Two-Point Perspective
    - Constructing a Perspective from a Multiview
- Types of Three-Dimensional Views
- Types of Three-Dimensional Objects
    - Paper Space / Model Space
    - Orthographic Projections / Isometric Projections

Unit 2

Chapter 2

- Introduction to Points and Lines
- Points
    - Finding the Location of a Point
- Lines
    - Types of Lines
        - Frontal Lines
        - Horizontal lines
        - Profile Lines
        - Vertical Lines and Oblique Lines
    - Determining the Location of a Line
    - Bearing, Azimuths, Grade and Slope
        - Bearings

        - Azimuths
    - Converting from Bearings to Azimuths
        - For Azimuths using North as their reference
        - For Azimuths using South as their reference
    - Slope
    - Grade

Unit 3

Chapter 3

- Introduction Auxiliary Views
    - Creation of Auxiliary Views
        - Creation of a Primary Auxiliary View from a Two-Dimensional AutoCAD Drawing using the Folding Line Method
        - Creation of an Auxiliary View from an AutoCAD Three-Dimensional Model
    - Secondary Auxiliary Views
    - Successive Auxiliary Views

Unit 4

Chapter 4

- Introduction to Planes
    - Defining a Plane
        - Line and a Point

        - Three Points
        - Two Intersecting Lines
        - Parallel Lines
    - Types of Planes
        - Normal Planes
        - Inclined Planes
        - Oblique Planes
    - Relating Planes to AutoCAD
    - XY Plane (AutoCAD)
    - Location of Points on Planes
    - Location of Lines on Planes
    - Locating the Piercing Point of a Line and a Plane
        - Auxiliary View Method
        - Cutting Plane Method
    - Location of the Intersection of Two Planes
        - Auxiliary View Method
        - Piercing Point Method
        - The Cutting Plane Method
    - Determining the Angle between Two Planes

Unit 5

Chapter 5

- Introduction to Revolutions
    - Revolution of a Point
    - Revolution of a Line

- Successive Revolved Views
- Revolution of a Solid

Unit 6

Chapter 6

- Introduction to Developments
  - Parallel-Line Developments
    - Development of a Right and Square Prism
    - Development of a Regular Cylinder
    - Development of a Truncated objects
    - Development of a Truncated Right and Square Prism
    - Development of Truncated Cylinder
    - Development of Top and Bottom Truncated Prisms and Cylinders
    - Development of Oblique Prisms and Cylinders
  - Radial-Line Developments
    - Development of a Right Pyramid
    - Development of a Truncated Right Pyramid
    - Development of a Right Circular Cone
    - Development of a Truncated Right Circular Cone
    - Development of Oblique Pyramids and Cones
  - Triangulation Developments
    - Development of Sheet-Metal Transitions
  - Linking a Database to a Development Using AutoCAD
    - Introduction to Databases
    - Math Functions
    - Introduction to DBCONNECT

- Launching the Database Connectivity Manager
- Working with the Data Source
- Editing and Viewing Information Contained within a Database
- Creating a Link to a Graphic Object
- Sheet Metal Drawings

Unit 7

Chapter 6

- Introduction to Inventor
  - Creating a Sheet Metal Part in Inventor
  - Sheet Metal Styles
  - Sheet Metal Tools
  - Face Tool
  - Contour Flange Tool
  - Flange Tool
  - Hem Tool
  - Fold Tool
  - Bend Tool
  - Corner Seam Tool
  - Cut Tool
  - Corner Round Tool
  - Corner Chamfer Tool
  - Punch Tool
  - Creating Faces and Flanges

Unit 8

Chapter 7

- Introduction to Dimensioning
  - Dimensioning systems
  - Dimensioning rules
  - Definitions
  - Introduction to Tolerances
  - Geometric Dimensioning and Tolerances
  - Statistical Tolerancing
  - MMC and LMC
  - Clearance Fit

Unit 9

Chapter 8

- Introduction to Vectors
  - Finding the Resultant of Concurrent and Coplanar Vectors
  - Introduction to Sine, Cosine, and Tangent
  - Using the Parallelogram Method to Add Vectors
  - Adding More Than Two Concurrent Vectors
  - Using Excel to Find the Resultants of Concurrent Coplanar Vectors
  - Finding the Resultant of Concurrent Noncoplanar Vectors
  - Applying the Theory of Vectors to Force
  - Characteristics of a force
  - Newton's Laws of Motion

- First law of motion.
- Second law of motion.
- Third law of motion.

- Determining the Direction of a Force
- Equilibrium of a System of Forces
  - Free-Body Diagrams

Unit 10

- Review session
- Project

Unit 11

Review and Final Examination

- Review session
- Final examination

COURSE OBJECTIVES

After successful completion of this course, the student will have the opportunity to:

1. Identify the four major classes of 2D views.
2. Orthographic Projection (multiview)
3. Describe the two types of orthographic projections and where they are used.
4. Name the six views produced by a multiview drawing.
5. Explain the importance of folding lines.
6. Describe how measurements are transferred from view to view.
7. Define and list the three categories of axonometric projections.
8. Describe how an isometric scale is constructed.
9. Be able to identify a Dimetric Projection
10. Be able to identify Trimetric Projections
11. Define and describe the three categories of oblique projections.
12. Define One-Point Perspective, Two-Point Perspective and Multiview Perspective.
13. Describe the difference between non-parametric and parametric solid models.
14. Determine the equivalent distance in statute miles and feet for a given degree of latitude.
15. Determine the equivalent in hours of a given degree of longitude.
16. Describe the difference between a bearing and an azimuth.
17. Determine the bearing and azimuth of a given line.
18. Convert from bearings to azimuths and from azimuths to bearings.
19. Describe the function of auxiliary views.
20. Identify and describe the difference between the two methods used for the construction of auxiliary views.
21. Construct primary, secondary, and successive auxiliary views using the folding-line method.
22. Name the three methods to establish an auxiliary folding line.
23. Describe the difference between a surface and a plane.
24. List the four ways that the boundaries of a plane may be defined.
25. List the three types of planes encountered in descriptive geometry.

26. Determine the location of a point on a plane.
27. Determine the location of a line on a plane.
28. Locate the piercing point of a line and a plane using the auxiliary view and cutting plane methods.
29. Locate the intersection of two planes.
30. Describe the difference between the Change-of-Position Method and the Revolution Method.
31. List the principles regarding the revolution of a point, a line, a plane and a solid.
32. Determine the true length of a line using the revolution method.
33. Determine the true shape and size of a plane using the revolution method.
34. List the five categories of materials.
35. Identify the common methods of seaming and hemming sheet metal.
36. Calculate the stock length required to construct a seam or hem.
37. Use the parallel-line technique to produce the development of a right prism, oblique prism, truncated prism, right circular cylinder, oblique cylinder, and truncated cylinder.
38. Use the radial-line technique to produce a development of a right cone, oblique cone, truncated cone, right pyramid, oblique pyramid, and truncated pyramid.
39. Use the triangulation technique to produce a development of a transitional part.
40. Describe the difference between vector and scalar quantities.
41. Define concurrent, coplanar, noncoplanar, components and resultant.
42. Define Angular Degree and Radian.
43. Identify the three types of triangles, and the hypotenuse, adjacent and opposite sides of a triangle.
44. Find the resultant of a concurrent coplanar vector system using the parallelogram method.
45. Find the resultant of more than two concurrent coplanar vectors using the polygon method.
46. Describe the characteristics of a force and the units used to measure them.
47. State and apply Newton’s First, Second and Third Laws of motion.

Related SCANS Objectives

1. Organizes, processes, and maintains written or computerized records and other forms of information in a systematic fashion.
2. Knows how social, organizational, and technological systems work and operates effectively within them.
3. Prevents, identifies, or solves problems in descriptive geometry with computers, and other technologies.
4. Judges which set of procedures, tools, or machines, including computers and their programs, will produce the desired results.
5. Employ computers to acquire, organize, analyze, and communicate information.
6. Select and analyze information and communicate the results to others using oral, written, graphic, pictorial, or multi-media methods.
7. Identify need for data, obtain them from existing sources or create them, and evaluate their relevance and accuracy.
8. Competently performing the tasks of communicating and interpreting information to others, including determining information to be communicated.
9. Participate in conversation, discussion, and group presentations about the change-of-position method and the revolution method.
10. Communicate thoughts, ideas, information, and messages.
11. Competently use computers to process information by entering, modifying, retrieving, storing, and verifying data and other information in descriptive geometry.
12. Makes suggestions to modify existing systems to improve products or services, and develops new or alternative systems.
13. Understand and responds to listener feedback and asks needed questions.
14. Demonstrate competence in selecting technology by determining desired outcomes and applicable constraints; visualizing the necessary methods and applicable technology; evaluating specifications; and judging which machine or tool will produce the results.
15. Competent performance in managing time including properly identifying tasks to be completed and ranking tasks in order of importance. Develop and follow an effective,

workable schedule based on accurate estimates of such things as importance of tasks, time to complete tasks, time available for completion, and task deadlines.

16. Participate in conversation, discussion, and group presentations about descriptive geometry.

TEACHING STRATEGIES

The curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools in the classroom.

COURSE RESOURCES

Student Textbook Package

Standiford, K. & Standiford, D. *Descriptive Geometry: An Integrated Approach Using AutoCAD, 2nd Ed. NY: Delmar Publishers, 2006.*

References and Resources

ITT Tech Virtual Library

Login to the ITT Tech Virtual Library (http://www.library.itt-tech.edu/) to access online books, journals, and other reference resources selected to support ITT Tech curricula.

- General References
  - >Reference Resources>Descriptive Geometry >
  - >Program Links>Computer Drafting and Design>Link Library>Descriptive Geometry
  - >Program Links>Proffessional Organizations

- www.adda.org American Drafting and Design Association website
- www.asme.org/ American Society of Mechanical Engineers website
- www.sme.org Society of Manufacturing Engineers website
- www.astm.org American Society for Testing and Materials website
- www.ieee.org IEEE website

- **>Program Links>Recommended Links**
  - www.globalspec.com/ GlobalSpec Engineering and Technology Search Engine and Portal
  - http://www.cad-portal.com/ Resource for Engineering Professionals
  - http://www.3dcontentcentral.com/3dcontentcentral/ 3D Content Central
  - http://academics.triton.edu/faculty/fheitzman/commands.html Descriptions and options related to AutoCAD commands; part of the Triton College Web site.
  - http://www.caddepot.com/ The best place on the Internet for downloading CAD shareware
  - http://www.digitalcad.com/2001/02_feb/features/acadzone/acadzone22feb2.htm On-line AIA CAD Layer Guideline Reference

- **Books**

The following books are related to this course and are available through the ITT Tech Virtual Library

- Books (ITT Tech Virtual Library)
  - Just Enough AutoCAD 2006 by George Omura
  - AutoCAD 2004 Bible by Ellen Finkelstein
  - AutoCAD 2004: One Step at a Time Series by Timothy Sean Sykes

All links to web references outside of the virtual library are always subject to change without prior notice

EVALUATION & GRADING

COURSE REQUIREMENTS

1. **Attendance and Participation**

   Regular attendance and participation are essential for satisfactory progress in this course.

2. **Completed Assignments**

   Each student is responsible for completing all assignments on time.

3. **Team Participation (if applicable)**

   Each student is responsible for participating in team assignments and for completing the delegated task. Each team member must honestly evaluate the contributions by all members of their respective teams.

Evaluation Criteria Table

The final grade will be based on the following weighted categories:

CATEGORY	WEIGHT
Portfolio Drawings	10%
Lab Assignments	20%
Quizzes	15%
Final Exam	25%
Project 1	25%
Participation	5%
Total	**100%**

Grade Conversion Table

Final grades will be calculated from the percentages earned in class as follows:

A	90 - 100%	4.0
B+	85 - 89%	3.5
B	80 - 84%	3.0
C+	75 - 79%	2.5
C	70 - 74%	2.0
D+	65 - 69%	1.5

D	60 - 64%	1.0
F	<60%	0.0

COURSE OUTLINE

Wk	Lsn	Lesson Title	Reading	Activity Type						
				Writing Assignment	Quiz	Discussion	Project	Other		
1	1	Viewing an Object	Chapter 1	X		X				
2	1	Points and Lines	Chapter 2	X		X				
3	1	Auxiliary Views	Chapter 3	X		X				
4	1	Planes	Chapter 4	X	X	X				
5	1	Revolutions	Chapter 5	X		X				
6	1	Developments	Chapter 6	X		X				
7	1	Using Inventor to Create Sheet Metal Parts	Chapter 6	X	X	X				
8	1	Dimensioning, Tolerancing, Interferences, and Fits	Chapter 7	X		X				
9	1	Vector Geometry	Chapter 8	X		X				
10	1	Final Project and Portfolio			X	X	X			
11	1	Review and Final Examination					X			

INTENT/INTERFACE

Among the different technical disciplines current practiced in today's world the drafting and design technician is perhaps one of the most valuable. For without the drafting and design technician, technology would not be able to advance at its current rate. For it is the drafting and design technician that is responsible for the creation and execution of plans for a project. However, their work would be meaningless without the ability to convey their findings to the outside world through effective written, oral and graphic communication. Of these three forms of transmitting knowledge - graphics is often the most important. For this reason, graphic communication is positively crucial to preparing and presenting a project for construction.

