

**ITT Technical Institute**  
**DT2510T**  
**Advanced CAD Methods**  
**Onsite and Online Course**

**SYLLABUS**

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**Credit hours:** 4.5

**Contact/Instructional hours:** 67 (41 Theory Hours, 26 Lab Hours)

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

Prerequisites: DT1230T CAD Methods or equivalent

**Course Description:**

This is a course in computer-aided design for the advanced CAD user. Students utilize a typical CAD system to design and analyze mechanical systems, architectural structures and other devices. This course reinforces CAD skills studied in the CAD Methods course.

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## COURSE SUMMARY

### COURSE DESCRIPTION

This is a course in computer-aided design for the advanced CAD user. Students utilize a typical CAD system to design and analyze mechanical systems, architectural structures and other devices. This course reinforces CAD skills studied in the CAD Methods course.

### MAJOR INSTRUCTIONAL AREAS

1. Using Attributes
2. Smart Drawings with Parametric Tools
3. 3D Modeling and Imaging
4. CAD Customization and Integration
5. Creating and Working with Dynamic Blocks
6. Plotting in Model Space and from Layouts
7. Storing and Extracting Data from Attributes
8. Attaching External Drawings and Images
9. Dimensioning and Designing with Parametric Constraints
10. Creating Advanced 3D Models
11. Rendering Models with Lights, Cameras, and Materials

### COURSE LEARNING OBJECTIVES

By the end of this course, you should be able to:

1. Work with externally referenced images and drawings.
2. Plot technical drawings to scale with title blocks.
3. Plot from model space and from layout.
4. Develop symbol libraries of blocks containing text and attributes.
5. Exchange data and drawings.
6. Populate tables with text and data stored in fields.
7. Create a 3D model and visualize forms in 3D.
8. Create realistic rendered models with both natural and artificial light.
9. Demonstrate the use of cameras.

10. Utilize CAD commands to draw and shape complex curves and 3D curved objects.
11. Utilize parametrically constrained geometry.
12. Utilize customization and integration tools.

## COURSE OUTLINE

### MODULE 1: CAD METHODS OVERVIEW

#### COURSE LEARNING OBJECTIVES COVERED

- Work with externally referenced images and drawings.
- Plot technical drawings to scale with title blocks.
- Plot from model space and from layout.

#### TOPICS COVERED

- Adding Xrefs
- Plotting the Plan
- WYSIWYG Plotting Using Layout Views
- Adding an Output Device
- Preparing a Drawing for Text
- Text Formatting in AutoCAD
- Substituting Fonts
- Creating and Editing Dimensions
- Dimensioning Non-orthogonal Objects
- Adding Tolerance Notations
- Working with Paper Space Viewports

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapters 7, 8, 9, 11, and 15.	No	8 hr
<b>Lesson:</b> Study the lesson for this module.	No	1.5 hr
<b>Discussion:</b> Participate in the discussion titled “Design Preferences.”	Yes	N/A
<b>Lab:</b> Complete the lab titled “My House My Way—Layout.”	Yes	N/A
<b>Project:</b> Read and begin the project.	No	1 hr

Total Out-Of-Class Activities: 10.5 Hours

## MODULE 2: MASTERING INTERMEDIATE SKILLS

### COURSE LEARNING OBJECTIVES COVERED

- Work with externally referenced images and drawings.
- Plot technical drawings to scale with title blocks.
- Plot from model space and from layout.
- Develop symbol libraries of blocks containing text and attributes.

### TOPICS COVERED

- Creating and Using a Symbol
- Modifying a Block
- Grouping Objects
- Adding Tables to Your Drawing
- Importing and Exporting Tables
- Creating and Editing Attributes
- Using the DXF File Format to Exchange CAD Data with Other Programs
- Using AutoCAD Drawings in Page Layout Programs

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapters 4, 10, 12, and 19.	No	12.5 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Quiz:</b> Prepare for Quiz 1.	No	1 hr
<b>Quiz:</b> Take Quiz 1.	Yes	N/A
<b>Lab:</b> Complete the lab titled “My House My Way—Floor Plan.”	Yes	N/A
<b>Analysis:</b> Submit the analysis titled “Working Smart, Not Hard.”	Yes	1 hr
<b>Project:</b> Continue work on Project Part 1.	No	2 hr

Total Out-Of-Class Activities: 18.5 Hours

### MODULE 3: MASTERING ADVANCED SKILLS

#### COURSE LEARNING OBJECTIVES COVERED

- Work with externally referenced images and drawings.
- Develop symbol libraries of blocks containing text and attributes.
- Exchange data and drawings.
- Populate tables with text and data stored in fields.

#### TOPICS COVERED

- Working with a Raster Image and PDF Files
- Managing Layers
- Using External References and Advanced Tools
- Connect Objects with Geometric Constraints
- Control Sizes with Dimensional Constraints
- Working with the Block Editor
- Printing 3D Models

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapters 13, 14, and 17.	No	13 hr
<b>Reading:</b> Biehler & Fane, Chapters 7 and 9.	No	2 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Discussion:</b> Participate in the discussion titled “My House My Way.”	Yes	N/A
<b>Lab:</b> Complete the lab titled “My House My Way—Layout.”	Yes	N/A
<b>Project:</b> Submit Project Part 1.	Yes	3 hr

Total Out-Of-Class Activities: 20 Hours

## MODULE 4: 3D MODELING AND IMAGING

### COURSE LEARNING OBJECTIVES COVERED

- Work with externally referenced images and drawings.
- Plot technical drawings to scale with title blocks.
- Plot from model space and from layout.
- Create a 3D model and visualize forms in 3D.
- Create realistic rendered models with both natural and artificial light.
- Demonstrate the use of cameras.
- Utilize CAD commands to draw and shape complex curves and 3D curved objects.
- Utilize parametrically constrained geometry.

### TOPICS COVERED

- Working with Polylines
- Drawing in 3D Using Solids
- Creating 3D Forms from 2D Shapes
- Turning a 3D View into a 2D AutoCAD Drawing
- Using Viewports and Array Tools
- Creating Complex 3D Surfaces
- Moving Objects in 3D Space
- 3D Printing

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapters 16, 18, 20, and 21.	No	18 hr
<b>Reading:</b> Biehler & Fane, Chapters 2 and 10.	No	1 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Quiz:</b> Prepare for Quiz 2.	No	1 hr
<b>Quiz:</b> Take Quiz 2.	Yes	N/A
<b>Lab 1:</b> Complete the lab titled “My Sculpture—3D Model.”	Yes	N/A
<b>Lab 2:</b> Complete the lab titled “My Sculpture—3D Printing.”	Yes	N/A
<b>Analysis:</b> Submit the analysis titled “Design Changes.”	Yes	1 hr

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Project:</b> Begin work on Project Part 2.	No	1 hr

Total Out-Of-Class Activities: 24 Hours



## MODULE 5: EDITING AND VISUALIZING 3D SOLIDS

### COURSE LEARNING OBJECTIVES COVERED

- Plot technical drawings to scale with title blocks.
- Plot from model space and from layout.
- Exchange data and drawings.
- Create a 3D model and visualize forms in 3D.
- Create realistic rendered models with both natural and artificial light.
- Demonstrate the use of cameras.
- Utilize CAD commands to draw and shape complex curves and 3D curved objects.
- Utilize parametrically constrained geometry.
- Utilize customization and integration tools.

### TOPICS COVERED

- Working with Polylines
- Drawing in 3D Using Solids
- Creating 3D Forms from 2D Shapes
- Turning a 3D View into a 2D AutoCAD Drawing
- Using Viewports and Array Tools
- Creating Complex 3D Surfaces
- Moving Objects in 3D Space
- 3D Printing

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapters 22 and 23.	No	11 hr
<b>Reading:</b> Biehler & Fane, Chapters 13, 14, and 16.	No	4.5 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Discussion:</b> Participate in the discussion titled “Future of 3D Printers.”	Yes	1 hr
<b>Quiz:</b> Prepare for Quiz 3.	No	1 hr
<b>Quiz:</b> Take Quiz 3.	Yes	N/A
<b>Lab 1:</b> Complete the lab titled “My House My Way—Scaled Model.”	Yes	N/A

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Lab 2:</b> Complete the lab titled “My House My Way—Landscape.”	Yes	N/A
<b>Project:</b> Continue work on Project Part 2.	No	2 hr

Total Out-Of-Class Activities: 21.5 Hours

## MODULE 6: MANAGING AND SHARING YOUR DRAWINGS

### COURSE LEARNING OBJECTIVES COVERED

- Work with externally referenced images and drawings.
- Plot technical drawings to scale with title blocks.
- Plot from model space and from layout.
- Create a 3D model and visualize forms in 3D.
- Create realistic rendered models with both natural and artificial light.
- Demonstrate the use of cameras.
- Utilize CAD commands to draw and shape complex curves and 3D curved objects.
- Utilize parametrically constrained geometry.
- Utilize customization and integration tools.

### TOPICS COVERED

- Share Drawings Online
- Manage Your Drawings with Design Center and the Tool Palettes
- Convert Multiple Layer Settings
- Export STL Files
- Connect to a Third-Party Print Service

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> Omura & Benton, Chapter 25.	No	6 hr
<b>Reading:</b> Biehler & Fane, Chapter 15.	No	1 hr
<b>Lesson:</b> Study the lesson for this module.	No	1.5 hr
<b>Analysis:</b> Submit the analysis titled “Design Changes.”	Yes	1 hr
<b>Project:</b> Submit Project Part 2.	Yes	1 hr

Total Out-Of-Class Activities: 10.5 Hours

## EVALUATION AND GRADING

### EVALUATION CRITERIA

The graded assignments will be evaluated using the following weighted categories:

CATEGORY	WEIGHT
Discussion	10%
Analysis	15%
Lab	30%
Quiz	15%
Project	30%
TOTAL	100%

### GRADE CONVERSION

The final grades will be calculated from the percentages earned in the course, as follows:

GRADE	PERCENTAGE
A (4.0)	90–100%
B+ (3.5)	85–89%
B (3.0)	80–84%
C+ (2.5)	75–79%
C (2.0)	70–74%
D+ (1.5)	65–69%
D (1.0)	60–64%
F (0.0)	<60%

## LEARNING MATERIALS AND REFERENCES

### REQUIRED RESOURCES

#### COMPLETE TEXTBOOK PACKAGE

- Omura, G., & Benton, B. (2014). *Mastering AutoCAD 2015 and AutoCAD LT 2015: Autodesk official press (1st ed.)*. Indianapolis, IN: John Wiley and Sons, Inc.
- Biehler, J., & Fane, B. (2014). *3D printing with Autodesk 123D: Create and print 3D objects with 123D, AutoCAD, and Inventor*. Indianapolis, IN: Que.

#### OTHER ITEMS

- AutoCAD  
Available for download at <http://www.autodesk.com/education/free-software/all>

### RECOMMENDED RESOURCES

- Books and Professional Journals
  - Cadalyst Magazine
- Professional Associations
  - Autodesk Community
  - GrabCAD
  - The American Institute of Architects
- Other References
  - Bertoline, G. (2011). *Fundamental of graphics communication*. Glencoe, IL: McGraw-Hill.
  - Boothroyd, G. (2010). *Product design for manufacture and assembly*. New York, NY: CRC Press.
  - Koser, G., & Zirwas, D. (2011). *Workplace skills for success with AutoCAD 2011: Basics, 1/E*. Upper Saddle River, NJ: Prentice Hall.
  - Liebing, R. W. (2007). *Construction of architecture: from design to build*. New York, NY: John Wiley & Sons.
  - Muller, E. J., & Grau, P. A. (2008). *Architectural drawing and light construction*. Englewood Cliffs, NJ: Prentice Hall.
  - Ramsey, C. G., & Sleeper, H. R. (2010). *Architectural graphic standards for residential construction*. New York, NY: John Wiley & Sons.

- Tickoo, S. (2009). *AutoCAD 2010: A problem solving approach*. Florence, KY: Autodesk Press.

## INSTRUCTIONAL METHODS AND TEACHING STRATEGIES

The curriculum employs a variety of instructional methods that support the course objectives while fostering higher cognitive skills. These methods are designed to encourage and engage you in the learning process in order to maximize learning opportunities. The instructional methods include but are not limited to lectures, collaborative learning options, use of technology, and hands-on activities.

To implement the above-mentioned instructional methods, this course uses several teaching strategies, such as scenario-based lessons and task-based assessments based on real life tasks. Your progress will be regularly assessed through a variety of assessment tools including discussions, analysis, labs, quizzes, and a project.

## OUT-OF-CLASS WORK

For purposes of defining an academic credit hour for Title IV funding purposes, ITT Technical Institute considers a quarter credit hour to be the equivalent of: (a) at least 10 clock hours of classroom activities and at least 20 clock hours of outside preparation; (b) at least 20 clock hours of laboratory activities; or (c) at least 30 clock hours of externship, practicum or clinical activities. ITT Technical Institute utilizes a “time-based option” for establishing out-of-class activities which would equate to two hours of out-of-class activities for every one hour of classroom time. The procedure for determining credit hours for Title IV funding purposes is to divide the total number of classroom, laboratory, externship, practicum and clinical hours by the conversion ratios specified above. A clock hour is 50 minutes.

A credit hour is an artificial measurement of the amount of learning that can occur in a program course based on a specified amount of time spent on class activities and student preparation during the program course. In conformity with commonly accepted practice in higher education, ITT Technical Institute has institutionally established and determined that credit hours awarded for coursework in this program course (including out-of-class assignments and learning activities described in the “Course Outline” section of this syllabus) are in accordance with the time-based option for awarding academic credit described in the immediately preceding paragraph.

## ACADEMIC INTEGRITY

All students must comply with the policies that regulate all forms of academic dishonesty or academic misconduct. For more information on the academic honesty policies, refer to the Student Handbook and the School Catalog.

## INSTRUCTOR DETAILS

Instructor Name	
Office Hours	
Contact Details	

*(End of Syllabus)*