

ITT Technical Institute
DT1430
Parametric Modeling
Onsite and Online Course

SYLLABUS

Credit hours: 4.5


Contact/Instructional hours: 56 (34 Theory Hours, 22 Lab Hours)

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

Prerequisites: DT1230 CAD Methods or equivalent

Course Description:

This course examines the creation of parametric models utilizing design software. Topics include working with constrained geometry, creating and documenting assemblies, and advanced part modeling techniques.



COURSE SUMMARY

COURSE DESCRIPTION

This course examines the creation of parametric models utilizing design software. Topics include working with constrained geometry, creating and documenting assemblies, and advanced part modeling techniques.

MAJOR INSTRUCTIONAL AREAS

1. Specifying mechanical components
2. Tolerancing
3. Gears and cams
4. Fasteners and threads
5. Descriptive geometry
6. Parametric solid models
7. Working knowledge of engineering graphics
8. Design tools within Autodesk Inventor

COURSE LEARNING OBJECTIVES

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

1. Explain the basic concepts used to create parametric solid models.
2. Utilize 2D sketching in the solid modeling process.
3. Create a parametric solid model utilizing 2D sketches.
4. Edit an existing solid model utilizing feature modification.
5. Apply American National Standards Institute (ANSI) standards in the creation of technical drawings.
6. Create different views in Autodesk Inventor.
7. Develop an animated assembly drawing.
8. Employ the concepts used in the creation of various mechanical components for documentation and product simulation.
9. Apply geometric dimensioning and tolerancing (GD&T) using Autodesk Inventor.
10. Describe the use of the various types of bearings.

11. Select the appropriate component for specific tasks using the Content Center.
12. Create sheet metal drawings using Autodesk Inventor.
13. Create weldment drawings using Autodesk Inventor.

COURSE OUTLINE

MODULE 1: 2D SKETCHING AND 3D MODELING

COURSE LEARNING OBJECTIVES COVERED

- Explain the basic concepts used to create parametric solid models.
- Utilize 2D sketching in the solid modeling process.
- Create a parametric solid model utilizing 2D sketches.
- Edit an existing solid model utilizing feature modification.

TOPICS COVERED

- Creating a Sketch for a Part Using Inventor
- Using 2D Sketching Tools to Create Complex Shapes
- Creating and Editing 3D Models
- Creating and Using Work Planes

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 1, 2, and 3.	No	5 hrs.
Lesson: Study the lesson for this module.	No	1.5 hrs.
Discussion: Participate in the discussion titled “Sketches Converted to Solid Models.”	Yes	N/A
Lab: Complete the lab titled “Create a Basic Sketch and Solid Model in Inventor.”	Yes	N/A
Project: Read and begin the project.	No	1 hr.
Quiz: Prepare for Quiz 1.	No	1 hr.

Total Out-Of-Class Activities: 8.5 Hours

MODULE 2: PARAMETRIC MODELING

COURSE LEARNING OBJECTIVES COVERED

- Apply American National Standards Institute (ANSI) standards in the creation of technical drawings.
- Create different views in Autodesk Inventor.
- Develop an animated assembly drawing.

TOPICS COVERED

- Orthographic and Section Views
- Sheet Drawing Standards
- Creating and Editing Assembly Drawings
- Assembly Animation

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 4 and 5.	No	8 hrs.
Lesson: Study the lesson for this module.	No	2 hrs.
Discussion: Participate in the discussion titled “Need for Orthographic Drawings.”	Yes	2 hrs.
Lab 1: Complete the lab titled “Create an Orthographic Sheet Drawing in Inventor.”	Yes	N/A
Lab 2: Complete the lab titled “Assembly Drawings.”	Yes	N/A
Quiz: Take Quiz 1.	Yes	N/A
Project: Continue to work on Project Part 1.	No	4 hrs.

Total Out-Of-Class Activities: 16 Hours

MODULE 3: CREATING THREADS, DIMENSIONS, AND TOLERANCES

COURSE LEARNING OBJECTIVES COVERED

- Apply American National Standards Institute (ANSI) standards in the creation of technical drawings.
- Employ the concepts used in the creation of various mechanical components for documentation and product simulation.
- Apply geometric dimensioning and tolerancing (GD&T) using Autodesk Inventor.

TOPICS COVERED

- Thread Terminology
- Drawing Threads
- Using Washers, Nuts, and Setscrews
- Dimensioning Objects
- ANSI Standards and Conventions
- Tolerance Conventions and Meaning
- Applying Tolerances

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 6, 7, and 8.	No	9 hrs.
Lesson: Study the lesson for this module.	No	2 hrs.
Lab 1: Complete the lab titled “Threads and Fasteners.”	Yes	N/A
Lab 2: Complete the lab titled “Dimensioning.”	Yes	N/A
Lab 3: Complete the lab titled “Tolerancing in Inventor.”	Yes	N/A
Project: Submit Project Part 1.	Yes	4 hrs.
Quiz: Prepare for Quiz 2.	No	2 hrs.

Total Out-Of-Class Activities: 17 Hours

MODULE 4: SPRINGS AND SHAFTS

COURSE LEARNING OBJECTIVES COVERED

- Employ the concepts used in the creation of various mechanical components for documentation and product simulation.
- Select the appropriate component for specific tasks using the Content Center.

TOPICS COVERED

- Drawing Springs
- Compression, Extension, and Torsion Springs
- Drawing Shafts
- Using Content Center to Add O-rings, Keys, and Pins to Shafts
- Using 3D Printing
- Exporting Models to a 3D Printer

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 9 and 10.	No	5 hrs.
Reading: Biehler & Fane, Chapters 11 and 14.	No	5 hrs.
Lesson: Study the lesson for this module.	No	2 hrs.
Discussion: Participate in the discussion titled “Benefits of 3D Printing.”	Yes	N/A
Quiz: Take Quiz 2.	Yes	N/A
Lab 1: Complete the lab titled “Springs and Shafts in Inventor.”	Yes	N/A
Lab 2: Complete the lab titled “Machine Vise 3D Group Project.”	Yes	N/A
Quiz: Prepare for Quiz 3.	No	2 hrs.
Project: Begin work on Project Part 2.	No	4 hrs.

Total Out-Of-Class Activities: 18 Hours

MODULE 5: CREATING BEARINGS AND GEARS

COURSE LEARNING OBJECTIVES COVERED

- Employ the concepts used in the creation of various mechanical components for documentation and product simulation.
- Describe the use of the various types of bearings.

TOPICS COVERED

- Types of Bearings
- Using Bearings in Assemblies
- Gear Terminology and Types of Gears
- Using Gears in Assemblies

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 11 and 12.	No	5 hrs.
Lesson: Study the lesson for this module.	No	2 hrs.
Discussion: Participate in the discussion titled “Types of Bearings for Various Applications.”	Yes	N/A
Lab 1: Complete the lab titled “Bearings.”	Yes	N/A
Lab 2: Complete the lab titled “Gears.”	Yes	N/A
Quiz: Take Quiz 3.	Yes	N/A
Project: Continue work on Project Part 2.	No	3 hrs.

Total Out-Of-Class Activities: 10 Hours

MODULE 6: SHEET METAL DRAWINGS AND WELDMENTS

COURSE LEARNING OBJECTIVES COVERED

- Create different views in Autodesk Inventor.
- Develop an animated assembly drawing.
- Employ the concepts used in the creation of various mechanical components for documentation and product simulation.
- Apply geometric dimensioning and tolerancing (GD&T) using Autodesk Inventor.
- Select the appropriate component for specific tasks using the Content Center.
- Create sheet metal drawings using Autodesk Inventor.
- Create weldment drawings using Autodesk Inventor.

TOPICS COVERED

- Creating Sheet Metal Drawings
- Creating Weldments
- Creating Weld Symbols

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
Reading: Bethune, J. (2015), Chapters 13 and 14.	No	5 hrs.
Lesson: Study the lesson for this module.	No	2 hrs.
Lab 1: Complete the lab titled “Sheet Metal Drawings.”	Yes	N/A
Lab 2: Complete the lab titled “Weldment Drawings.”	Yes	N/A
Project: Submit Project Part 2.	Yes	4 hrs.

Total Out-Of-Class Activities: 9 Hours

EVALUATION AND GRADING

EVALUATION CRITERIA

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

CATEGORY	WEIGHT
Discussion	10%
Lab	50%
Project	20%
Quiz	20%
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

- Bethune, J. (2015). *Engineering design graphics with Autodesk inventor 2015*. Upper Saddle River, NJ: Pearson Education/Peachpit Press.
- Biehler, J. & Fane, B. (2014). *3D printing with Autodesk 123D: Create and print 3D objects with 123D, AutoCAD, and Inventor*. Upper Saddle River, NJ: Que Publishing.

OTHER ITEMS

- Autodesk Inventor Software

RECOMMENDED RESOURCES

- Books, Professional Journals

- CAD User Magazine:

<http://www.caduser.com>

- CAD Digest:

<http://www.caddigest.com>

- Professional Associations

- American Design Drafting Association:

<http://www.adda.org/>

- Autodesk User Group International (AUGI):

<http://www.augi.com/>

- Women in Technology International:

<http://www.witi.com/>

- Autodesk Student Community:

<http://students.autodesk.com>

- Autodesk Website:

www.autodesk.com

- Information Search

Use the following keywords to search for additional online resources that may be used for supporting your work on the course assessments:

- Parametric

- GD&T
- 3D modeling
- Sheet metal drawings
- Weldments
- Tool design
- Injection molds
- Dimensioning
- Auxiliary views
- Assembly drawings
- BOM
- Springs
- Gears

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 real life examples and hands-on exercises. Your progress will be regularly assessed through a variety of assessment tools including discussions, 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)