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Course Outline for DSNT 71

ASSEMBLY AND DESIGN USING PRO/ENGINEER

Effective: Fall 2002

I. CATALOG DESCRIPTION:
DSNT 71 — ASSEMBLY AND DESIGN USING PRO/ENGINEER — 3.00 units

Continuation class in a series for developing fundamentals of computer-aided design using Pro/ENGINEER software, a 3-D solid modeler. Application of the Pro/ENGINEER CAD System in assembling manufacturing models and creating drawings.

2.00 Units Lecture 1.00 Units Lab

Prerequisite
DSNT 70 - Manufacturing and Desgn Using Pro/ENGINEER
with a minimum grade of C

DSNT 66B - Electro-Mechanical Design

Grading Methods:
Letter Grade

Discipline:

	MIN
Lecture Hours:	36.00
Lab Hours:	54.00
Total Hours:	90.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 3

III. PREREQUISITE AND/OR ADVISORY SKILLS:
Before entering the course a student should be able to:

A. DSNT70
1. use NT operating system;
2. use Pro/E parametric feature-based design software;
3. model designs with a 3-D solid modeler;
4. know the Pro/E Sketcher;
5. create basic and construction features;
6. create complex shapes;
7. redefine the features (making engineering changes).

B. DSNT66B
1. contribute to a team's progress in identifying and defining design parameters and considerations;
2. interpret the criteria for product and manufacturing engineering that results in design for manufacturability;
3. analyze and utilize the stages involved in the design process while recognizing their flexibility;
4. utilize full gamut of information sources for designers including standards, technical reports, handbooks, references, patents, published papers, registers, tables, vendor catalogs, and specialized search engines and websites;
5. protect the sanctity of the design database, especially within CAD applications;
6. describe flow of design parts, manufacturing, implementation and documentation;
7. demonstrate familiarity with the process of automated and computer-aided manufacturing;
8. sketch and detail entire assembly with proper notations and form proper revisions;
9. realize that revisions are a necessary part of design process and their inevitability can be prepared for by developing a healthy mental recovery strategy;
10. demonstrate familiarity with the associative dimensioning capabilities of CAD;
11. demonstrate an understanding of the job description and the skills needed;
12. show awareness of the opportunities for Design Technology careers and advancement.

IV. MEASURABLE OBJECTIVES:
Upon completion of this course, the student should be able to:

A. use Pro/E parametric feature-based design software;
B. create user defined features and family tables;
C. combine component parts and subassemblies to form assemblies;
D. apply top-down design approach in forming assembly;
E. modify, document, analyze, or reorient assemblies;

F. create drawing formats;
G. generate 2D drawings from 3D solid models;
H. apply detailing to drawings per ASME Y14.5M 1994;
I. create sections and auxiliary views;
J. create exploded views;
K. create balloon views and add BOM tables to drawings.

V. CONTENT:
A. Components of computer graphics system
1. General description/facilities
2. Advantages
B. NT Windows system operation
1. Operating system (NT Windows) and applications
2. Command structure
3. Symbols, characters, punctuation, and keyboard
4. Utility routines: file, save, retrieve
C. Working in the Pro/ENGINEER environment
1. Review of Start-up and Release Updates
2. Review of Pro/ENGINEER Windows
3. Review of Pro/ENGINEER Modes
4. Review of View control and orientation
5. Managing files
6. Assembly Mode
7. Drawing Mode
8. Designing of Assembly Mode
D. Placing components into Assemblies
1. Introduction
2. Understanding User defined features (UDF)
3. Defining Family Tables, Generic Parts, and Instances
4. Creating a Family Table for a part
5. Creating a subassembly
6. Establishing assembly constraints
7. Redefining component constraints
8. Modifying constraints
9. Analysis of clearance/interference issues
10. Generating a parts list from bill of material
11. Adding item balloons
12. Creating a section assembly view
13. Changing component visibility
14. Adding parameters
15. Creating a table to generate parts list automatically
E. Creating Exploded Assemblies
1. Introduction
2. Generating exploded views
3. Editing exploded views
4. Setting Display modes for components
5. Moving and rotating components
6. Altering & manipulating pictorial views
7. Saving named views for future reference
8. Using multiple sheets
9. Using multiple models
10. Adding item balloons
F. Specifying Drawing Format
1. Creating drawings with views
2. Creating/Saving title block and sheet formats
3. Changing the view scale
4. Selecting and displaying appropriate views for detailing
5. Manipulating views
6. Selecting paper size and units
7. Retrieving formats from library
G. Generating Detail Drawings
1. According to ASME Y14.5M-1994 standards
2. Dimensioning a part
3. Adding text and notes (.dtl files)
4. Adding geometric tolerancing information
5. Using Pro/MARKUP to view checker changes
6. Modifying Dimensions and drawing entities
H. Designing Sections and Auxiliary Views
1. Identifying the need for sectional views
2. Establishing a .dtl file for detailing and creating section
3. drawings
4. Identifying cutting planes
5. Creating sections
6. Detailing section views
7. Producing auxiliary views
8. Creating scaled detail views of complex geometry
9. Apply standard drafting conventions and linetypes

VI. METHODS OF INSTRUCTION:
A. **Lecture** -
B. **Discussion** - Discussion and team problem-solving
C. Hands-on interactive tasks of modeling designs and assembly
D. **Demonstration** - Demonstration to present concepts

VII. TYPICAL ASSIGNMENTS:
A. Problem solving or performance of lab projects and lessons: 1. Clarify the internal construction of a part by creating a sectional view to expose these details for dimensioning and an auxiliary view to clearly show the inclined surface. Bring up a previously drawn solid model Anchor and establish a .dtl file. Do Lesson #18 (Lamit pg.18-7), selecting datum planes,

cross sections, and auxiliary view to complete an accurate detailing of the form. 2. Workbook Assignment: Create drawings with exploded views and multiple sheets and multiple models to understand how to compile the components of a total assembly. Do Project #20 (Lamit pg.20-9) to create a complete documentation package for the Coupling Assembly, including all models and drawings required to manufacture the parts and assemble the components. Create and extract existing models and drawings as needed, generating plots of the package. B. Reading/Discussion: 1. Typical Topic: “Design Intent” and how it is used in determining the selection of dimensions (Lamit, pg.17-2). Discuss in your words how the design intent used in the original sequence of feature creation will determine the dimensions shown on the drawing.

VIII. EVALUATION:

A. **Methods**

B. **Frequency**

1. Frequency:
   a. Assignments for each class session
   b. One midterm and one final examination

IX. TYPICAL TEXTS:

1. Lamit, Gary *Basic Pro/ENGINEER 2000i².*, Brooks Cole/Thompson Learning, 2000.
2. Lamit, Gary and Kitto, Kathleen *Engineering Graphics and Design.*, West Publishing Company, 1997.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Two 3 ½" computer diskettes
B. Computer use certificate