COURSE OUTLINE

MECH 112 – 3D Modeling

Prepared By: Daniel J. Miller
Revised By: Cullen L. Haskins 5/11/2015
A. **TITLE:** 3D Modeling

B. **COURSE NUMBER:** MECH 112

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall or Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   1 lecture hour per week and 4 lab hours per week

H. **CATALOG DESCRIPTION:**
   A 3D CAD Modeling course that introduces the student to topics of dimensioning, tolerances, assembly and detail drawings, keys, key seats, gears, and cams. 3D Rapid prototyping systems, 3D Modeling concepts and ASME standards will be emphasized. All CAD drawings will be created using solid modeling software.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): none
   b. Co-requisite(s): none

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Interpret geometric dimensioning and tolerance from engineering drawings and apply to engineering drawings.</td>
<td>1. Communication 3. Professional Competence</td>
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<tr>
<td>c. Examine assembly drawings to develop knowledge of the assembled parts function and interaction.</td>
<td>1. Communication</td>
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<tr>
<td>d. Differentiate the terminology of gears, cams, and threads</td>
<td>2. Critical Thinking</td>
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<td>f. Produce gears, cams, and threads for use in engineering applications</td>
<td>3. Professional Competence</td>
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<tr>
<td>g. Illustrate welding drawings and symbols</td>
<td>3. Professional Competence</td>
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<td>h. Compile assembly drawing packages that meet industry standards.</td>
<td>1. Communication 3. Professional Competence</td>
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K. **TEXTS:**
   ISBN: 1585037990

L. **REFERENCES:**
   American National Standards Institute Drafting Manual
M. EQUIPMENT:  
Computer Lab with solid modeling software, computers, plotting device, 3D printer, dial or digital calipers for measurement.

N. GRADING METHOD: A-F

O. MEASUREMENT CRITERIA/METHODS:  
• Exams  
• Quizzes  
• Homework  
• Projects

P. DETAILED COURSE OUTLINE: (must use the outline format listed below)

I. Threaded, non-threaded fasteners and springs  
   A. Nomenclature  
   B. Symbolically drawn  
   C. Use of fasteners  
   D. Use of Springs

II. Geometric Dimensioning and Tolerancing  
   A. Datums  
   B. Material condition symbols  
   C. Tolerance of form  
   D. Tolerance of profile  
   E. Tolerance of orientation  
   F. Tolerance of runout  
   G. Locational tolerance  
   H. Virtual condition

III. Gears  
   A. Identify the various types  
   B. Draw and label the nomenclature of a gear

IV. Cams  
   A. Identify the various types of cams and followers  
   B. Draw displacement diagrams and cams

V. Weldment Drawing  
   A. Identify the symbols of welding  
   B. Correctly place the symbols on a welding drawing

VI. Advanced Assembly Drawing  
   A. Detail drawing of mating parts  
   B. Compile an assembly drawing  
   C. Develop a materials list  
   D. Purchased parts vs. locally produced
Q. LABORATORY OUTLINE:

I. Parametric Modeling Fundamentals
II. Constructive Solid Geometry Concepts
III. Model History Tree
IV. Parametric Constraints Fundamentals
V. Geometric Construction Tools
VI. Parent/Child Relationships and the BORN Technique
VII. Part Drawings and Associative Functionality
VIII. Incorporation of GD&T into Drawings
IX. Datum Features and Auxiliary Views
X. Symmetrical Features in Designs
XI. Advanced 3D Construction Tools
XII. Sheet Metal Designs
XIII. Welding Designs
XIV. Assembly Modeling – Putting It All Together
XV. Content Center and Basic Motion Analysis
XVI. 2D Design Reuse, Collision and Contact
XVII. Introduction to Stress Analysis