**Catalogue Description:** (1-1-2)


**Status in Curriculum (Required or Elective):** Required (offered Fall & Spring)

**Prerequisites:** Phys102, ME 210

**Co-requisites:** None

**Prerequisites by Topics:**
- Friction, Potential & Kinetic Energy, Projectile Motion, impact (Phys102)
- 2-D and 3-D drawing, animation (ME210)

**Textbook:** No Textbook; Course notes and Power Point Presentations.

**References:**

**Coordinator:** Dr. Nesar Merah, Professor of Mechanical Engineering

**Goals:**
The purpose of this course is to teach the students:
1. The basics of design process in Mechanical Engineering
2. Idea generation and creativity
3. The use of evaluation techniques and critical thinking to take decisions,
4. To appreciate the dynamics of a design team and experience teamwork
5. Basic manufacturing processes and the use of simple machine tools.
6. Construction, testing and debugging of simple prototypes.
7. Communication skills in design

**Course Outline (Lecture Topics):**

<table>
<thead>
<tr>
<th>Topics</th>
<th>Lectures</th>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to mechanical engineering design</td>
<td>1/2</td>
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<tr>
<td>Teamwork, efficient meetings, conflict solving</td>
<td>1/2</td>
<td>1</td>
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<tr>
<td>Customer needs, specifications</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Brainstorming (Idea Generation)</td>
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<td>2</td>
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<tr>
<td>Decomposition and product architecture</td>
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<tr>
<td>Conceptual design: concept generation and selection of the best alternative</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Project Related Basic Science and Engineering</td>
<td>1</td>
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<tr>
<td>Modeling and estimation</td>
<td>1</td>
<td>1</td>
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<tr>
<td>design of experiments for testing</td>
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<td>1</td>
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<tr>
<td>Manufacturing processes</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Construction, debugging and testing of modules</td>
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<td>2</td>
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<tr>
<td>Assembly, system testing and competition details</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Communication Skills</td>
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<tr>
<td>Engineering ethics and liability</td>
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Design Activities/Projects:
The course is project-based with hands-on experience.

Computer Usage:
Students are required to use SOLIDWORKS to produce design drawings and to simulate projectile motion using Excel.

Laboratory:
3 hours/week hands-on activities. Students work in teams to design, model, manufacture and test mechanical system.

Assessment Tools:
- Quizzes
- Class activities & assignments
- Teamwork
- Application of design process to project
- Innovation in Prototype Design
- Presentation (oral/Poster)
- Competition
- Design Notebook

Course Learning Outcomes:
1. Apply engineering design process to design mechanical systems
2. Understand customer needs and translate them into engineering design concepts
3. Analyze and evaluate alternative designs and select most appropriate ones
4. Produce quality sketches, drawings and physical models of their concepts
5. Operate simple machine tools to produce models and prototypes
6. Construct, test and debug mechanical systems
7. Participate in and lead efficient engineering design teams & meetings
8. Maintain a detailed and informative design notebook
9. Communicate engineering designs

Course Learning Outcomes mapped to Student Outcomes:

<table>
<thead>
<tr>
<th>Course-to-Student outcome mapping</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
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<tbody>
<tr>
<td>1,2,3,4</td>
<td>6</td>
<td>1,2,3</td>
<td>7</td>
<td>1,2,5</td>
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Emphasis*
- L: Little/None
- M: Moderate
- S: Strong

Status of Continuous Improvement review of this Course:

Date reviewed:  
Reviewed by: Design Dynamics Group
Prepared by: Dr. Nesar Merah
Date prepared: November 1, 2014