Course Number: MECH 3200
Semester: 2016 Spring
Course Title: “Concepts in Design and Manufacturing”
Credit Hours: 2 (LEC 2)
Prerequisites: MECH 2110 (grade of C or better); w/coincidence: MECH 2220

Lecture Schedule
MW 1:00 to 1:50 p.m., Shelby 1126

Professor
Dr. Peter D. Jones, Mechanical Engineering Dept., Wiggins 3418G, (334) 844-3368, jonesp1@auburn.edu, Office Hours MW 2-3 pm.

Teaching Assistant
Mr. Daniel A. Hardin, Mechanical Engineering Dept., Wiggins 3424; Phone TBA; dah0029@auburn.edu; Office Hours TBA.

Course Objective
Acquire mechanical design project skills that will be more fully developed and exercised in the Comprehensive Design series (MECH 4240/50).

Course Outcomes
Upon completion of this course, the student will be able to:
1. Follow a systematic, needs-based, solution-neutral, optimal design methodology.
2. Organize a design effort as a managed project, and communicate its progress and results.

Website
All course materials will be posted on http://www.eng.auburn.edu/~pjones/mech3200.htm
- Main course website is not Canvas.
- Course is published on Canvas, but Canvas is only used for electronic submission of homework
- Canvas homework scores are unofficial

Textbook

Supplemental material will be posted to the course website.

Recommended Reading
(Lots of horror stories about broken machines – mostly with design as the root cause)

(Former textbook – generally good reference; great section on creative neural processes; thorough on materials processing; misleading on Quality Function Deployment, so avoid that)
(Former textbook – concise and straightforward)

(Good study on project management of complex systems design)

(Very difficult. But the most authoritative source in Design Methodology. Excellent on embodiment design)

(One of many of this type, but more concise and engineeringish than most)

(Former textbook – good on creative processes; excellent Quality Function Deployment chapter; the 3rd edition (2003) is more tightly written, if you can find that)

**Deliverables**

**Prerequisite Exam**

Focus on MECH 2110, given very early in the term. Open book, open notes. No cell phones, computers, or other communication. Bring a calculator and a (non-cell phone) watch.

**Homework**

- Expected to be individual and original (consultation between students is encouraged, but duplication or near-duplication of deliverable work is not allowed).
- Submission only on Canvas; must be in pdf file format.
- Page format:
  - Free, as long as is neat, professional, concise, informative
  - No cover page
  - First page heading must include:
    - Descriptive title (like “Homework - Design Embodiment”)
    - Student’s name
    - Course number
    - Due date
    - Omit name of Professor or TA – the work is yours, not theirs
- Text:
  - Typed
  - Avoid prose – suggest bulleted paragraph format:
    - Leading sentence(s)
    - Bullet points (avoid unnecessary words)
    - Concluding sentence(s)
• Tables:
  o Word processed
  o Embedded

• Equations:
  o Hand-written is OK, but…
  o Wouldn’t it be better to just learn MS Equation?

• Graphics alternatives:
  o Professionally hand drawn (i.e., scaled, with a straight edge, correct angles, and compass or circle templates)
  o CAD is fine, but careful not to over-do it (i.e., make the working principles clear, but not necessary to add superfluous surface detail, etc.)
  o MS PowerPoint, or equivalent (a carefully executed ppt sketch can show quite a lot!)
  o Embed in text (unless inappropriate).

Exams
All (non-prerequisite) exams are closed book, notes, and electronic devices, with the exception of reference sheets as detailed below. Not necessary to turn in the reference sheets. Unlimited blank scratch paper allowed. Calculator might be necessary. Also timepiece (non-cellphone).

Midterm - 50 min. Reference sheet: one side of one 8½ × 11 inch page, any font or margins.

Final – 150 min. Reference sheet: both sides of one 8½ × 11 inch page, any font or margins.

<table>
<thead>
<tr>
<th>Grading Weights</th>
<th>Grading Scale</th>
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<tbody>
<tr>
<td>Prerequisite exam 5%</td>
<td>Total (achieved) Grade (at least)</td>
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<tr>
<td>Homework 25%</td>
<td>90% A</td>
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<tr>
<td>Midterm 20%</td>
<td>80% B</td>
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<tr>
<td>Final 50%</td>
<td>70% C</td>
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<tr>
<td>Total (max possible) 100%</td>
<td>60% D</td>
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**Tentative Schedule** (complete reading assignments before class)

<table>
<thead>
<tr>
<th>Monday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>13 Jan</td>
<td>20 Jan</td>
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<tr>
<td>Prerequisite exam</td>
<td>Subject: Design process</td>
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<td>Reading: Dym, et ál Chap.1</td>
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<td>25 Jan</td>
<td>27 Jan</td>
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<tr>
<td>Prerequisite exam</td>
<td>Subject: Functional decomposition</td>
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<td>Due: Homework – Design thinking</td>
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<td>Date</td>
<td>Subject</td>
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<tr>
<td>1 Feb</td>
<td>Problem definition – users and needs</td>
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<td>8 Feb</td>
<td>Conceptual design – working principles</td>
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<td>15 Feb</td>
<td>Conceptual design - evaluation</td>
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<td>22 Feb</td>
<td>Embodiment design – system functional structure and modularization</td>
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<td>29 Feb</td>
<td>Midterm exam</td>
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<td>7 Mar</td>
<td>Embodiment design – product architecture</td>
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<tr>
<td>21 Mar</td>
<td>Embodiment design – component materials &amp; manufacture</td>
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<tr>
<td>28 Mar</td>
<td>Embodiment design – parametric optimization</td>
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<td>4 Apr</td>
<td>Detail design</td>
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<td>11 Apr</td>
<td>Communication - written</td>
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<tr>
<td>18 Apr</td>
<td>Communication - graphic</td>
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<tr>
<td>25 Apr</td>
<td>Project scheduling</td>
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<td>4 May</td>
<td>Final Exam: Noon – 2:30 pm</td>
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ABET
“Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.”

Accessibility
Students who need disability accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours in the first week of classes, or as soon as possible if accommodations are needed immediately. If there is a conflict with office hours, an alternate time can be arranged. To set up a meeting, please contact the instructor by e-mail. If accommodations have not been approved through the Office of Accessibility, but are needed, an appointment should be made with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

Students who qualify for extra time on exams are expected to contact the Office of Accessibility independently (and in a timely manner), and are responsible for arranging to take their exams under the proctoring of that Office.

Attendance
Class attendance is expected but not recorded. Late submission of assigned work will be allowed only if accompanied by an approved University excuse.

Behavior
Professional behavior is expected of all class participants.

Contingency
If normal class and/or lab activities are disrupted due to illness, emergency, or crisis situation, the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to the syllabus and/or course assignments will replace the original materials.

Evacuation
Should an unsafe environment develop in any class meeting room, design space, or shop facility, all class participants must proceed immediately outdoors, or to a designated safe area. Dismissal by the instructor is not necessary (i.e., establish personal safety first – worry about attendance afterwards).

Excused Absences
Students are granted excused absences from class for the following reasons:
- Illness of the student or serious illness of a member of the student's immediate family
- Death of a member of the student's immediate family
- Trips for student organizations sponsored by an academic unit
- Trips for university classes
- Trips for participation in intercollegiate athletic events
- Subpoena for a court appearance
Religious holidays
Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. Please consult the Student Policy eHandbook for more information on excused absences.

Honesty
Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the Student Policy eHandbook will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Make-Up
Arrangement to make up a missed major examination (e.g.: hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.