ME 421 Advanced Computer Aided Design

Catalog Description:
Use of solid modeling software (CATIA) for advanced component design, creation of complex multi-component assemblies, animation studies, and rendering. Course concludes with a month-long final project.

Course Prerequisites: ME 301 or instructor permission

Meeting Times:
Section 1 Class Periods - Tuesday 2:00-3:15
Consulting Periods – Thursday 2:00-3:15

Instructional Team:
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Nick Brubaker  brub8655@vandals.uidaho.edu

Course Website: http://www.webpages.uidaho.edu/mindworks/CATIA.htm

Course File Management:
Go to Z:\Engineering\SeniorDesign\Catia Course\28. Fall 2019 you will find:
Course Materials  Section 1

This is where you will keep your CATIA models and coursework. Homework assignments will be submitted on the bblearn page.

Course Learning Outcomes:

1) Gain familiarity with the following CATIA workbenches: part design, assembly design, generative surface design, sheet metal design, generative drafting, digital mock-up (DMU), and photo studio

2) Navigate CATIA’s on-line help system to learn about new workbenches, cultivating transferable software learning skills.

3) Use ‘save management’ to successfully copy, update, and organize solid modeling documents.

4) Employ relational features, such as functions and parameters, in part design and assembly modeling for easier product development, maintenance, and reuse.

5) Create 2D drawing documents and 3D model based definitions as guides for manufacturing.

6) Create a catalog of parts based on a design table, facilitating part family design.

7) Implement environments, materials, light sources, and camera techniques for impactful visualization of design products.

8) Based on introductory experience with generative surface design, use simple surfaces as the starting point for solid model construction.

9) Create accurate Finite Element models and test the analysis software’s capabilities.

10) Advance organization knowledge about design realization, design analysis, design visualization, or design for manufacturing by creating/updating electronic learning objects (videos, quick references, tutorials, and exemplar designs) for future use by yourself and other students.
**Course Activities:**

This course introduces you to concepts and tools for producing solid models and engineering drawing packages using CATIA. The knowledge, skills, and perspectives you develop will greatly enhance your senior design experience and will be highly marketable in the engineering workplace, including summer internships. The first sessions of the course will help you transition from Solidworks to CATIA. The following sessions examine special features of CATIA that are useful in the modern manufacturing workplace. There are no hourly exams in this class, and hence problem sets and projects will constitute the majority of your grade. Class preparation is important for getting the most out of your lab time. As such, a portion of your grade is based on quizzes that review contents of a set of student-authored instructional videos that have been specially created for this course. Nearly all assignments are individual, but there will be a team-based, major synthesis project at the end of the course. Outcomes of synthesis projects along with ongoing senior design projects will be shown publicly at the December Design Snapshot. By organizing your course work throughout the term in the ‘Catia Course’ folder on the shared drive, you will develop an electronic resource that can be a valuable reference in future design activities as well as in job interviews.

**Course Grading:**

40% Assignments

- Homework Exercises

15% Quizzes

- There will typically be a quiz before and in each class period

45% Final Project

- Snapshot Day Powerpoint display
- Project Specific Deliverables (stored electronically)
- Lessons Learned/Course Assessment

**Rubric for Scoring Quizzes/Assignments/Project Elements:**

<table>
<thead>
<tr>
<th>Score</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Exemplary, insightful, worthy of sharing with entire class</td>
</tr>
<tr>
<td>3</td>
<td>Complete, correct, long-term reference value to self</td>
</tr>
<tr>
<td>2</td>
<td>Complete, minor errors, limited reference value to self</td>
</tr>
<tr>
<td>1</td>
<td>Incomplete, major errors, no supporting documentation</td>
</tr>
<tr>
<td>0</td>
<td>Submitted late, must complete</td>
</tr>
</tbody>
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Grade of ‘A’ corresponds to average on semester work above 3.20
Grade of ‘B’ corresponds to average on semester work between 2.6 and 3.19
Grade of ‘C’ corresponds to average on semester work between 2.0 and 2.59
Grade of ‘F’ corresponds to average on semester work less than 2.0