Mech 403 Computer Aided Design, Rice University,
Fall 2009, J.E. Akin (revised 8/27/09)

This class is mainly a self-pace course with few formal lectures. There are several tutorials to be completed for SolidWorks (SW), CosmosWorks (CW), SnagIt, TK Solver, and Ansys 11 (see the link www.owlnet.rice.edu/~mech403/403_Tutorial_Schedule_09.pdf).

There are sketching assignments (see www.owlnet.rice.edu/~mech403/mech403_sketching_09.pdf for examples of standard views, www.owlnet.rice.edu/~mech403/403_Section_Sketches_F08.pdf for an example of a section view, and www.owlnet.rice.edu/~mech403/403_Auxiliary_View_Sketching08.pdf) for an auxiliary view example). You are required to construct and prepare drawings, with dimensions, for one solid part (see www.owlnet.rice.edu/~mech403/403_Solid_Part_09.pdf), and to complete a group project. The group project will be the main variable part of the course grade. It will require both a written report and oral presentation.

Class	*Day*	*Date*	*Topic*	*Assignment*
1	Tue	8/25	Organization, SW, CW	Examine SW Help
2	Thur	8/27	SW, SnagIt Demo	Standard view sketches, Begin SW tutorials
3	Tue	9/1	CW Demo	Complete section view sketch
4	Thur	9/3	TK Solver / Case solvers	Complete auxiliary view sketch
5	Tue	9/8	Dimension Standards	Continue SW tutorials
6	Thur	9/10	SW	Begin posted 3D body construction
7	Tue	9/15	SW, Stress concepts	Construct 3D body
8	Thur	9/17	SW	Submit 3D body drawings with dimensions
9	Tue	9/22	SW, CW	Begin required CW tutorials
10	Thur	9/24	CW, Thermal concepts	Continue tutorials, Revise 3D drawing/dimensions
11	Tue	9/29	CW	Continue tutorials
12	Thur	10/1	CW, Vibration concepts	Continue tutorials, Select group members
13	Tue	10/6	CW Optimization	Continue tutorials
14	Thur	10/8	Select group project	State members of project group
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15	Thur	10/15	Ansys Workbench demo	Complete Tutorials, Report group members
16	Tue	10/20	Group Project	
17	Thur	10/22	Group Project	-
18	Tue	10/27	Group Project	- -
19	Thur	10/29	Group Project	Submit 1st draft of part(s) drawing/dimensions
20	Tue	11/3	Group Project	- -
21	Thur	11/5	Group Project	-
22	Tue	11/10	Group Project	Submit 2nd draft of part(s) drawing/dimensions
23	Thur	11/12	Group Project	-
24	Tue	11/17	Group Project	Outline presentation PowerPoint-
25	Tue	11/19	Group Project	-
26	Thur	11/24	Complete presentation PPT	-Draft design report hardcopy due
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27	Tue	12/1	Group presentations	-Attend and critique
28	Thur	12/3	Group presentations	-Final design report hardcopy due

The group project will represent the main variable portion of your grade (25%). If you do not suggest an acceptable project you will be assigned the default project. The group project report is graded on writing style and the communication value of the technical images (from SnagIt) and less on the actual results presented. Groups will have the option of accepting the group grade received on the draft report, or revising the draft during the last class for a final report grade. The class website has several Help and Demo files. See www.owlnet.rice.edu/~mech403

SolidWorks Reference Materials (see bookshelf in ME241):

W. Silva, "SolidWorks Workbook", CDP Inc., 2004
W. Silva, "Introduction to SolidWorks", CDP Inc., 2003.
W. Silva, "SolidWorks Assemblies", CDP Inc., 2004.

The above three items, various texts and other software manuals provide additional material and examples that may not be covered in required tutorials. **The reference materials are not to be removed from the room without written permission.**

CosmosWorks Reference Material (by J.E. Akin, online)

www.owlnet.rice.edu/~mech403/DemoFiles/Cosmosworks_Displayed.pdf We will be using that finite element software as a black box tool, without lectures on the theory behind it. A course on detailed finite element theory (Mech 417) is available next term. It is very risky to use such tools without an understanding of its basic theoretical foundation and limitations. The above link gives some theory and example applications for stress analysis, heat transfer, etc. It contains a detailed index, and the table of contents is linked to the sections, so it should be easy to navigate through the 300-page pdf file.

Other finite element references in room ME241 include:

SDRC, COSMOSWorks Designer, 2006
SDRC, COSMOSWorks Professional, 2006
J.R. Steffen, Analysis of Machine Elements using COSMOSWorks Professional, SDC Pub.,2006
P.M. Kurowski, Engineering Analysis with COSMOSWorks, SDC Pub., 2004

Other References

SDRC, COSMOSFloWorks, 2005
SDRC, COSMOSMotion, 2006
K.L. Lawerence, ANSYS Tutorial, Release 11, SDC Pub., 2007

3-D Printing

Rice does have a 3-D printer that can make physical copies (scaled up or down) of any valid solid built in SolidWorks. They are expensive. The Rice printer uses a polymer material. Commercial printers can use sand, wax, polymer, gold, steel, etc. to build parts. They are very expensive. Printed 3D samples of models built on SW will be passed around class.