ME 4740/5740 Advanced Machine Design  
Fall 2013, Class #5042  
3 Credit Hours

http://www.ohio.edu/people/cyderst/ME4740/

Instructor: Dr. Cyders, 228 Stocker, cyderst@ohio.edu

Prerequisites: ME 3700

Meetings: T Th, 10:30AM – 11:50 AM, ARC 101

Office Hours: TBA

Textbooks:  
Machinery’s Handbook (any edition, 26 or newer preferable), Industrial Press  
Inviting Disaster: Lessons from the Edge of Technology by James R. Chiles

Course Content:  
Stress Analysis/Model Validation  
Reverse Engineering  
Advanced Material Selection  
Parametric Optimization  
DFMA  
Design Codes  
Stochastic Modeling/Design for Reliability

Grading:  
Weekly Reports 30%  
Research Project 20%  
Final Design Project 50%

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<th>Grade</th>
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<td>86.7-90</td>
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<td>83.3-86.7</td>
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Policies:  
Attendance: Attendance is compulsory. This class involves a lot of in-class individual and team work. I do not take attendance in class. I do, however, expect professional behavior out of all students. If a student is late for class or misses a class unexcused, it is their responsibility to gather material missed from their colleagues. Exams may only be made up if an absence is excused beforehand in writing. Acceptable reasons for missing an exam are outlined in the student handbook.

Assignments: All assignments must be turned in at the beginning of the class in hard copy, unless specified otherwise. Late assignments will not be accepted.

Academic Honesty: Academic misconduct is defined in the OU student manual. The sanctions for misconduct are also specified in the manual. In particular, the first incidence of cheating on an exam or individual homework will result in a zero for said assignment. Infractions may also be referred to the Director of University Judiciaries, where additional sanctions may be imposed. Repeated instances will result in failure of the course. Copying individual work will not be tolerated. Please be particularly careful about plagiarism/ copying others’ work. Cite references and sources in all reports.
and projects. Sanctions may be appealed through the grade appeal process outlined in the OU Student Manual.

**Cell Phones:** Please turn cell phones off while in class. Students are reminded that they are expected to behave as professionals in class.

**Disabilities:** Any student who suspects s/he may need an accommodation based on the impact of a disability should contact the class instructor privately to discuss the student’s specific needs and provide written documentation from the Office of Student Accessibility Services. If the student is not yet registered as a student with a disability, s/he should contact the Office of Student Accessibility Services.

**Homework:** Part of the grade on every assignment is the professionalism exhibited in your presentation of results. I may go so far as to reject work that is difficult to decipher for grading. It is often useful to make a separate copy of your assignment after working through it to clearly organize your results. You should be able to hand this to any competent design engineer, and they should be able to quickly determine on their own what the problem was, what assumptions you made, what models you applied, what equations you used, and what your results and recommendations were. An example of an acceptable assignment can be found on the ME 4740 website.

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**Course Outcomes**

**At the end of this course, ME 4740 students will be able to:**

(1) Analyze and critique mechanical designs with respect to various criteria including (but not limited to) manufacturability, performance, safety and cost, and make recommendations for improvement on existing designs

(2) Identify critical areas of mechanical failure in machine designs, determine maximum allowable loads, and recommend relevant design changes accordingly

(3) Use reliability engineering tools such as fault tree analyses, FMEA and statistical tools to identify severe failure modes and relate them to design recommendations

(4) Identify key design information and recommend processes/sources to improve design performance by improving information quality

(5) Develop alternative materials/manufacturing methods/design approaches to achieve equivalent functionality and performance in existing mechanisms

(6) Construct custom design tools to accelerate the design optimization process

(7) Identify key design criteria and optimize part designs with respect to one or more of them

(8) Research a design code and design a part to be in compliance with it
(9) Discuss trade-offs in material selection for a part design on bases including (but not limited to) material properties, chemical interaction, compatibility, mechanical performance, cost and manufacturability

(10) Concurrently design and optimize interdependent machine parts

(11) Create and interpret professional-grade engineering part drawings