UNIVERSITY OF TOLEDO College of Engineering
CIVE 1150: Engineering Mechanics: Statics Spring 2009

Syllabus Rev. 0, January 13, 2009

Sections 041 & 091 TR 8:00-9:40 NI 2470
INSTRUCTOR: D.K. Nims, Ph.D., P.E. OFFICE: Nitschke Hall 3021
OFFICE HOURS: 3-5 PM TR and generally available after class
OFFICE PHONE: 530-8122 e-mail: Douglas.Nims@utoledo.edu

TA: Tesfaye & Brad Taylor
Office Hours: TBA

"The life we live depends heavily on the manmade physical artifacts around us. No manmade artifacts exist which were not in a designer's mind, before they were given physical reality."
Engineering and the Mind's Eye by Eugene S. Ferguson

Teaching Philosophy:

I enjoy teaching this class. This class is fundamental to your success in any course which involves solids or fluids. My basic perspective is that of Herodotus: "The teacher has not taught, unless the student has learned". I expect to help you be successful in this class and for you to leave this class well prepared to succeed in dynamics and strength of materials and subsequently machine design, structural analysis or biomechanics courses.

Prerequisites:

Math 1850: Calculus I, Physics 2130: Physics I

Conduct of the Course:

Four hours per week including lectures, discussions, and problem sessions. There are reading assignments, homework problems, quizzes, two midterm exams and a final examination. There will be a great deal of hands on and observed problem solving in the class. History has shown Regular attendance is necessary to be successful in the class. Quizzes will be short (12 minutes) at the beginning of class.

Text:

Vector Mechanics for Engineers: Statics, Eighth Edition, F.P. Beer, E.R. Johnston , McGraw-Hill, 2007.

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Grading:

There is no grading curve in the course. You are not competing against the other students. You will receive whatever grade you meet the standard for regardless of how many other students have that grade.

Weighting	
Homework & Quizzes	10%
2 Midterms @25%	50%
Final	40%
	100%

Grading Scale				
A 93+	B+ 87-89	C+ 75-79	D+ 63-66	F < 57
A- 90-92	B 83-86	C 70-74	D 60-62	
	B- 80-82	C- 67-69	D- 57-59	

Goals:

At the end of this course, you will be able to demonstrate by examination that you can

1) Draw free body diagrams
2) Write and solve equilibrium equations for particles and rigid bodies
3) Find internal and external reactions for rigid bodies
4) Find centroids and moments of inertia for plane figures
5) Draw shear and bending moment diagrams for statically determinate structures.
6) Present solutions to simple engineering problems in a professional manner
7) Keep track of units in the problems
8) Test the reasonableness of your answers.

Academic dishonesty:

You are encouraged to work together on the homework, but what you submit should be substantially your own work. The quizzes and exams are strictly individual with no assistance to be given or received.

Penalties range from loss of credit for the exam or assignment to failure in the course. Instances of academic dishonesty may be reported to the department and /or college. By rule, any instance of academic dishonesty prevents you from using grade deletion to replace the grade in the course.

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References:

For statics: Our text is the most popular in the country. It is an excellent text. It's only real weakness is that it has the blandness required to make a text popular. The other generally available texts follow the same general format for the same topics. Any other texts you come across are generally good references. In particular, Hibbler is a very clear writer.

For engineering vision and the basis of design: Henry Petroski has written several books. To Engineer is Human is his best. Design Paradigms is also excellent. The rest of his books and his column in Sigma Chi's magazine (The American Scientist) are all worth reading. Engineering and the Mind's Eye by Eugene S. Ferguson, MIT Press, 1992, is about the core of statics: visualization. Visions of a Flying Machine by Peter L. Jakab is the best overview of engineering I have ever read and it is a also a well written story (I've assigned this to some of my senior classes and they even liked it ☺).

For the interaction of engineering and society: October Sky by Homer H. Hickam Jr. is a mass-market paperback about aspiring to be an engineer (It's also a movie.). The Engineer in America by Terry S. Reynolds, University of Chicago Press, 1991. And something deep and pretentious, Wenk, Edward, Jr., Tradeoffs : imperatives of choice in a high-tech world, Johns Hopkins University Press, 1989 and Making waves : engineering, politics, and the social management of technology, University of Illinois Press, 1995 (Take care. Making Waves is very dry and idiosyncratic, but the genre is almost unpopulated.) Wenk was the technology adviser to several Presidents. He has an unparalleled vision of the complex interaction of technology and society. He expands on many of Marshall McCluhan's themes with more technical awareness.

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Course outline updated Apr 24, 2009

Week	Period	Date	Subject	Reading Assignment	Problem Assignment	HW Due
1	1	Jan 12 M	Engineering Vision, Skills, Values, and Teaching philosophy. Units, dimensions, Newton's Laws, Forces.	1.1-1.6 2.1-2.6	2.3, 5	Jan. 21 W
	2	Jan 14 W	Statics of Particles. Vector Addition, Force Resolution	2.1-2.6	2.7, 9, 11, 19	Jan 21 W
	3	Jan 16 F	Unit Vectors, Addition of Forces by Components,	2.7-2.8	2.12, 23, 28, 41	Jan 21 W
2	---	Jan 19 M	Martin Luther King Day – No Class	---	---	---
	4	Jan 21 W	Particle equilibrium, Free body diagrams	2.9-2.11	2.43, 47, 65, 67	Jan 28 W
	5	Jan 22 F	Forces in three dimensions.	2.12-2. 14	2.73, 87, 89	Jan 28 W
3	6	Jan 26 M	Forces in three dimensions.	2.12-2. 14	2.92	Feb 4 W
	7	Jan 28 W	Particle equilibrium in three dimensions	2.15	2.101, 107, 109	Feb 4 W
	8	Jan 30 F	Equivalent systems, Vector Cross Products, Moment of a force about a point	3.1-3.8	3.1, 5, 12, 17, 24, 30	Feb 4 W
4	9	Feb 2 M	Scalar product, moment about an axis.	3.9-3.11	3.35, 37, 51	Feb 11 W
	10	Feb 4 W	Scalar product, moment about an axis	3.9-3.11	2.134, 3.55, 57	Feb 11 W
	11	Feb 6 F	Couples. Resolution of force into a force-couple system	3.12-3.16	3.70, 72, 76, 80, 88, 98	Feb 11 W
5	12	Feb 9 M	Couples. Resolution of force into a force-couple system	3.16-3.20	3.101, 104, 113, 153	Feb 11 W
	13	Feb 11 W	Discussion	---	---	---
	14	Feb 13 F	**Midterm Chapters 1, 2, 3.**	---	---	---
6	15	Feb 16 M	Recap Midterm. Equilibrium of rigid bodies: 2 dimensional.	4.1-4.5	4.3, .15, .21, 27, 32	Feb 27 F
	16	Feb 18 W	Equilibrium of rigid bodies: 2 dimensional.	4.6	4.47, 69	Feb 27 F
	17	Feb 20 F	Two force body. Equilibrium of rigid bodies: 3 dimensional	4.6	4.81, 93,	Feb 27 F
7	18	Feb 23 M	Two force body. Equilibrium of rigid bodies: 3 dimensional	4.8-4.9	4.99, 105	Feb 27 W
	19	Feb 25 W	Equilibrium of rigid bodies (2D & 3D) Exam 1 Retest	4.1-4.9	4.115, 127, 138, 144	Mar 4 W
	20	Feb 27 F	Equilibrium of rigid bodies (2D & 3D)	4.1-4.9	4.145, 152	Mar 4 W
8	21	Mar 2 M	Equilibrium of rigid bodies (3D Examples)	4.9	4.116, 4.122s	Mar 18 W
	22	Mar 4 W	Plane trusses: method of joints	6.1-6.5	6.2, 6, 13, 16	Mar 18 W
	23	Mar 6 F	Plane trusses: method of joints	6.1-6.5	6.5, 6.25, 6.32	Mar 18 W
9		Mar 9 – Mar 13	Spring Break	---	---	---
10	24	Mar 16 M	Plane trusses: method of sections	6.7-6.8	6.23, 43, 45, .51, 55	Mar 25 W
	25	Mar 18 W	Frames	6.9-6.11	6.76, 88, .91, 139, 149	Mar 25 W
	26	Mar 20 F	Machines	6.12	6.125, 148, 164	Mar 25 W
11	27	Mar 23 M	Centers of Gravity, centroids of lines and areas	5.1-5.5	5.2, 3, 13,	Apr 1 W
	28	Mar 25 W	Centers of Gravity, centroids of lines and areas Centroids by Integration, Theorems of Pappus-Guldinus,	5.1-5.5 5.6-5.7	5.15, 23	Apr 1 W
	29	Mar 27 F	Centroids by Integration, Theorems of Pappus-Guldinus Vol. Centroids, Centroids of Composite Bodies	5.6-5.7 5.8-5.10	5.42, 47, 56 5.62, 73,	Apr 1 W
12	30	Mar 30 M	Vol. Centroids, Centroids of Composite Bodies	5.8-5.10	5.75, 81, 112	Apr 1 W
	31	Apr 1 W	Discussion	---	---	---
	32	Apr 3 F	**Midterm Chapters 4,5 and 6**	---	---	---
13	33	Apr 6 M	Recap midterm Internal forces and moments	7.1-7.2	7.1, 5, 12, 18, 20,	Apr 15 W
	34	Apr 8 w	Various Loadings. Shear and Bending Moment Diagrams	7.3-7.5	7.7, 19, 30, 33, 43	Apr 15 W
	35	Apr 10 F	Various Loadings. Shear and Bending Moment Diagrams	7.3-7.5	7.21, 24. 29, 36, 40, 54	Apr 15 W
14	36	Apr 13 M	Relationship between shear and bending moment	7.6	7.60, 64, 74, 75	Apr 22 W
	37	Apr 15 W	Relationship between shear and bending moment	7.6		Apr 22 W
	38	Apr 17 F	Moments of Inertia, Radius of gyration	9.1-9.5	9.3, 7, 21	Apr 22 W
15	39	Apr 20 M	Parallel axis theorem, Composite Areas	9.6-9.7	9. 28, 31,42,	Apr 29 W
	40	Apr 22 W	Shear & Moment Diagram Quiz		9.43, 51, 54	Apr 29 W
	41	Apr 24 F	Parallel axis theorem, Composite Areas Review of central concepts	9.6-9.7	9.187 2.123, 3.108, 5.133, 6.166,	Apr 29 W

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16	42	Apr 27 M	Discussion	----	2.57, 4.80, 6.100	May 1 F
	f43	Apr 29 W	Discussion	---	7.46, 7.49---	May 1 F
	44	May 1 W	Course summary	---	---	---

FINAL EXAM Friday May 8 10:15-12:15

Please Note:

1. Homework is generally due the Wednesday class following assignment.
2. Homework must be on engineering paper, on one side of the page with the answers highlighted.
3. Homework Pages must be stapled together.
4. Late homework will not be accepted.
5. All quizzes and exams are closed book and closed notes. The FE supplied reference book will be allowed for some quizzes and the final.
6. All quiz and exam questions will have antecedents in homework problems you have been assigned.
7. Solutions homework problems will be posted on the WebCT.
8. Academic dishonesty. You are encouraged to work together on the homework, but what you submit should be substantially your own work. The quizzes and exams are strictly individual with no assistance to be given or received.