MEM 202: ENGINEERING MECHANICS – STATICS

SPRING TERM 2014-2015

Course Syllabus

Instructor Information:

Name:	Dr. Antonios Kontsos	Ms Dani Liu	Mr Satish Rajaram
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Office Hours:	Monday & Wednesday 10:00-11:00am	Tuesday 3:00-5:00pm	Wednesday & Friday 4:00-5:00pm
Office:	172A AEL	174E AEL	174E AEL

Student Learning Information:

This course provides the starting engineering students with a smooth *transition from science-based mechanics problems to engineering-based mechanics problems*, i.e. from equilibrium of relatively simple force systems to force systems in structures with connected members and with complex geometry.

Catalog Description:

Covers intermediate static mechanics, an extension of the fundamental concepts and methods of static mechanics introduced in the freshman courses. Includes topics such as problem formulation and solution methods; two-and three-dimensional vector representation of forces, moments and couples; static equilibrium of particles, rigid bodies, and engineering structures; analysis of external and internal forces in structures via methods of free body diagrams; and properties of cross-sectional areas.

College/Department: College of Engineering / Department of Mechanical Engineering and Mechanics
Repeat Status: Can repeat for credit
Course Purpose within Program of Study: Required

Prerequisites: Physics 185 – Physics I (Minimum Grade: D) or Physics 111 – Physics I (Minimum Grade: D)

Textbook and On-line Resources:

Engineering Mechanics: Statics | Hibbeler | Engineering Mechanics: Statics, 14/E
ISBN-10: 0133918920, ISBN-13: 9780133918922, Publisher: Prentice Hall

Course Objectives:

This course provides the starting engineering students with a smooth *transition from science-based mechanics problems to engineering-based mechanics problems*, i.e. from equilibrium of relatively simple force systems to force systems in structures with connected members and with complex geometry. The specific objectives are:

1. Develop equilibrium equations for particles
2. Draw free body diagrams
3. Determine the resultants of a force and couple system
4. Reduce a force and couple system
5. Reduce a distributed load into a resultant force
6. Develop equilibrium equations for rigid bodies
7. Apply the method of joints and method of sections to solving truss problems
8. Develop equilibrium equations for frames and machines
9. Calculate the center of gravity and centroid for a system of particles and rigid body
10. Determine moment of inertia for planar areas

Lecture and Recitation Sections

	Section	CRN	Time	Room	Instructor
Lecture	A	30921	MON & WED 9:00 – 9:50 am	Curtis 340	Kontsos
Recitation	001	30125	THU 1:00 pm – 1:50 pm	Randall 329	TA
	002	32533	THU 2:00 pm – 2:50 pm	Randall 329	TA
	003	30744	THU 3:00 pm – 3:50 pm	Randall 329	TA

Assignments, Assessments and Evaluations:

Graded Assignments and Learning Activities

For each week there will be a homework assignment of problems for the current week's content. Homework will be completed and submitted during recitation on Thursdays. There will be a quiz each week in Recitation session on Thursdays. There will be one mid-term exam and a final exam.

Grading Matrix

- **Homework (weekly):** 5% - 3 problems to be assigned after each lecture.
- **Quiz (10):** 25% - Quiz in recitation consisting of one problem. Total of 10 quizzes.
- **Mid-Term Exam (1):** 35% - One Mid-Term Exam
- **Final Exam:** 35% - Given during finals week according to Registrar's schedule only. **Plan accordingly!**

The above may change as deemed appropriate by the instructor.

Grade Scale

Final grades will be based on the following scheme:

Numerical Score	Point Equivalent	Letter Equivalent	Numerical Score Used for Letter Grades and Overall Grade Calculations
97-100	4.00	A+	100.0
94-96	4.00	A	95.0
90-93	3.67	A-	91.5
87-89	3.33	B+	88.0
84-86	3.00	B	85.0
80-83	2.67	B-	81.5
77-79	2.33	C+	78.0
74-76	2.00	C	75.0
70-73	1.67	C-	71.5
67-69	1.33	D+	68.0
64-66	1.00	D	65.0
60-63	0.67	D-	61.5
< 60	0.00	F	0.0

Course Schedule (Subject to change):

Week	Period	Date	Topic	Book Section
1	L1	3/30	General Principles, Problem Solving	1.1 – 1.6
1	L2	4/1	Force Vectors/Systems	2.1 – 2.6
2	L3	4/6	Position Vectors, Force Vectors, Dot Product	2.7 – 2.9
2	L4	4/8	Equilibrium of a Particle, Free Body Diagram	3.1 – 3.4
3	L5	4/13	Force System Resultants – Moments	4.1 – 4.4
3	L6	4/15	Moment about an Axis, Moment of a Couple	4.5 – 4.6
4	L7	4/20	Couples, Simplification, and Equivalent Loading Systems	4.7 – 4.8
4	L8	4/22	Distributed Loading	4.9
5	L9	4/27	Rigid Body Equilibrium, 2-D Free Body Diagrams	5.1 – 5.2
5		4/29	Practice and Review for Mid-Term Exam	
6		5/4	**Mid-Term Exam - In Class Exam – Closed Book**	**Chapter 2, 3, 4**

6	L10	5/6	Equations of Equilibrium, Two-, and Three-Force Members	5.3 – 5.4
7	L11	5/11	3-D Free Body Diagrams, Equilibrium, Static Determinacy	5.5 – 5.7
7	L12	5/13	Truss Analysis – Method of Joints	6.1 – 6.3
8	L13	5/18	Zero-Force Members, Truss Analysis – Method of Sections	6.3 – 6.4
8	L14	5/20	Structural Analysis – Frames and Machines	6.6
9		5/25	**No Class – Memorial Day Holiday**	
9		5/27	Practice Session – Trusses, Frames and Machines	6.1 – 6.6
10	L15	6/1	Centroids, Center of Mass, Composite Bodies	9.1 - 9.3
10	L16	6/3	Moment of Inertia	10.1 – 10.4
11		6/8	Review for Final Exam	
			Final Exam as Scheduled by Registrar – Closed Book http://drexel.edu/registrar/scheduling/exams/	**Chapter 5, 6, 9, 10**

Academic Center for Engineers – ACE tutoring center

- **Location**: Main 005, down the stairs in the Great Court of Main Building.
- **Tutors**: The specific availability periods for all tutors can be located on the ACE schedule.

Contribution to Professional Component

Contributes to toward the 2nd year of engineering topics appropriate to developing the ability to work with equilibrium equations and develop free body diagrams. It prepares students for classes in mechanical and structural design.

Relationship to Program Outcomes:

Outcomes a - k	Content	Explanation	Evidence
a. An ability to apply knowledge of mathematics, science and engineering	**2**	This course requires the students to develop a general understanding of system equilibrium. The students learn how to apply and synthesize their knowledge of mathematics, science, and engineering.	Homework, Exams and quizzes
b. An ability to design and conduct experiments as well as to analyze and interpret data	**0**	NA	
c. An ability to design a system, component or process to meet desired needs	**2**	Students are first introduced to how the course materials are applied to real life problems, such as crane development and bridge design. Students are then given problems that are simplified versions of real world applications.	Homework, exams and quizzes
d. An ability to function on multidisciplinary teams	**0**	NA	NA
e. An ability to identify, formulate and solve engineering problems	**2**	The problems require students to identify, formulate and solve engineering problems.	Homework, exams and quizzes
f. An understanding of professional and ethical responsibility	**1**	This is emphasized as part of the engineer's overall responsibility.	Classroom discussion of safety factors and use redundant forces.
g. An ability to communicate effectively	**0**	NA	NA
h. The broad education necessary to understand the impact of engineering solutions in a global/societal context	**1**	The impact of engineering design on the environment (structures, buildings and bridges and devices) are covered.	Classroom discussion of safety factors and design with redundant forces for safety.
i. A recognition of the need for and an ability to engage in lifelong learning	**0**	NA	NA

j. A knowledge of contemporary issues	**0**	NA	
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice	**1**	Computer packages are used to explore the solution domain for homework assignments.	Homework

Academic Policies:

This course follows standard Drexel University policies, including the following:
http://www.drexel.edu/provost/policies/academic_dishonesty.asp
http://www.drexel.edu/studentlife/community_standards/overview/
http://www.drexel.edu/oed/disabilityResources/students
http://www.drexel.edu/provost/policies/course_drop.asp

Drexel Policy on Cheating (from the Provost's website):

"Cheating is an act or an attempted act of deception by which a student seeks to misrepresent that he or she has mastered information on an academic exercise that he/she has not mastered. Examples include, but are not limited to:

- Copying from another student's test paper
- Allowing another student to copy from a test paper
- Unauthorized use of course textbook or other materials, such as a notebook to complete a test or other assignment from the faculty member
- Collaborating on a test, quiz, or other project with any other person(s) without authorization
- Using or processing specifically prepared materials during a test such as notes, formula lists, notes written on the students clothing, etc. that are not authorized
- Taking a test for someone else or permitting someone else to take a test for you"

Please don't plagiarize or cheat; it isn't worth it. Cheating will result on a grade of zero for the assignment.

Statement for Students with Disabilities:

Students with disabilities requesting accommodations and services at Drexel University need to present a current accommodation verification letter (AVL) to faculty before accommodations can be made. AVL's are issued by the Office of Disability Resource (ODR). For additional information, contact ODR at3201 Arch Street, Suite 210.

215-895-1401 (Voice), or ***215-895-2299*** (TTY). *http://www.drexel.edu/oed/disabilityResources/*