SYRACUSE UNIVERSITY
LC SMITH COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

ECS 221 Engineering Mechanics – Statics
Fall 2013

CATALOG DESCRIPTION
Fundamentals of static equilibrium. Vector algebra. Forces, moments, equivalent force systems. Free body diagrams, equilibrium in two and three dimensions. Analysis of structures and machines. Centroids and moments of inertia.

INSTRUCTOR INFORMATION
Prof. Joan V. Dannenhoffer, P.E.
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Office Hours: M/T/W 2 – 3, TH 2 – 3:45, and by appointment, or whenever I am in my office with the door open.

TEACHING ASSISTANT INFORMATION
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Walk-in-Tutoring in Link 152
        T 6:30 – 9:30 PM, TH 7 – 10 PM

Academic Excellence Workshops
        TBD

Class and Recitation Times
        MWF 10:35–11:30 Sci-Tech 1-019
        M006 recitation M 11:40–12:35 Link 011
        M009 recitation M 12:45–1:40 Link 011
        M007 recitation W 11:40–12:35 Link 011
You need to know your recitation day and time, as it will be put on your HW sheets.

TEXTBOOK
Vector Mechanics for Engineers-Statics by F.P. Beer, E.R. Johnston, D.F. Mazurek, and E.R. Eisenberg, McGraw-Hill, 10th Edition, 2011

McGraw Hill Connect   http://connect.mcgraw-hill.com/class/statics_dannenhoffer_fall_2013

Blackboard
- The syllabus, course calendar, homework assignments, notes and content, and any notices regarding changes to assignments or calendars will all be posted on the course Blackboard website. Students are expected to consult the website frequently.

Homework
- Homework **must be completed on a Statics Worksheet**, multiple pages MUST be stapled, and homework must always be neat, legible and marked with the student's name and lab section. There will be one written HW problem due every class in addition to the Connect problems that will be due each week.
- Homework assignment due dates are posted in Blackboard. **Assignments will be due at 10:35 am in lecture on the due date. No exceptions as I will go over written HW in class on the day it is due.** Homework will be returned in lab (recitation).

Lecture
- Attendance and participation in lectures is expected.
- PLEASE, no phones (or other electronic communication devises) used during lecture.
- No laptops (without special arrangement with the instructor)**.**
- **Calculators are required in every class.**

Exams/Quizzes
- Fully Charged Calculators must be brought to all tests.
- There will be NO make-up exams.

Labs (Recitation)
- Attendance and participation in lab is a requirement. If you have not completed the lab assignment, you must complete it before 5 pm on Friday.

PRE/COREQUISITES BY TOPIC
To succeed in this course, students should possess the following knowledge and skills, all of which are presented and developed in MAT296 (Calculus II) and PHY211 (General Physics):
- Differential and integral calculus of a single variable (co-requisite)
- Introductory treatment of the basic principles of mechanics(prerequisite)

COURSE LEARNING OBJECTIVES

The successful student is expected to:
- **explain** how Newton's 1st, 2nd and 3rd Law apply to "statics' problems;
- **describe, identify, and effectively use** vectors to **model** "statics" problems;
- **represent and manipulate** forces and moments in 2- and 3- dimensions to **model** "statics" problems;
- **construct and sketch** Free-Body Diagrams**;**
- use the above to **formulate solutions** to elementary mechanical systems, trusses, and frames, including systems with interacting parts, springs, and dry friction;
- **define, predict, and compute** the properties of area and volumes (centroids and moments of inertia)

These course objectives satisfy ABET program outcomes *a* and *e*.
a. Ability to <u>apply knowledge</u> of mathematics, science, and engineering.
b. Ability to identify, formulate, and solve <u>engineering problems</u>.

COURSE LEARNING OBJECTIVE MEASUREMENT AND ASSESSMENT

Homework	10%
Class quizzes	5%
ARCHIMEDES (recitation)	10%
In-class exams (two)	20% each
Comprehensive final exam	30%
Class participation	5%

COURSE OUTCOMES

At the completion of the course, each student should be able to:

A) (vector algebra)
1. add, subtract, and multiply vectors by scalars using the parallelogram law
2. resolve vectors into components
3. perform basic operations on vectors using rectangular components in two and three dimensions
4. understand the definitions and properties of the vector and scalar product of two vectors and be able to compute them using rectangular components

B) (forces and moments)
1. relate forces arising in physical situations to their mathematical representation as vectors
2. understand the physical meaning of moment of a force about a point and a line and be able to compute these quantities in two and three dimensions
3. compute moments of couples
4. resolve forces into forces and moments, and reduce systems of forces

C) (elementary systems)
1. draw free body diagrams of particles, rigid bodies, and systems
2. model various connections and supports which arise in mechanical systems
3. apply Newton's 3rd law to interacting components of a mechanical system
4. write equilibrium equations in two and three dimensions
5. solve equilibrium equations and physically interpret solutions

D) (friction and structural applications)
1. understand the phenomenological characteristics of dry friction
2. solve elementary statics problems involving dry friction
3. recognize simple structures and mechanisms such as trusses, frames, and simple machines
4. understand particular features common to each class of mechanical system

E) (properties of areas and volumes)
1. compute centroids and centers of gravity for lines, areas, and solids of revolution by the method of composite bodies and by integration
2. compute moments of inertia, products of inertia, and polar moments of inertia of areas and solids of revolution by composite bodies and by integration
3. apply the parallel axis theorem
4. compute principle axes and principal moments of inertia

Academic Integrity

"Syracuse University sets high standards for academic integrity. Those standards are supported and enforced by students, including those who serve as academic integrity hearing panel members and hearing officers. The presumptive sanction for a first offense is course failure, accompanied by the transcript notation "Violation of the Academic Integrity Policy." The standard sanction for a first offense by graduate students is suspension or expulsion. Students should review the Office of Academic Integrity online resource "Twenty Questions and Answers About the Syracuse University Academic Integrity Policy" and confer with instructors about course-specific citation methods, permitted collaboration (if any), and rules for examinations. The Policy also governs the veracity of signatures on attendance sheets and other verification of participation in class activities. Additional guidance for students can be found in the Office of Academic Integrity resource: 'What does academic integrity mean?'"

Students are expected to comply with their responsibilities as set out in the Syracuse University Student Handbook. Including but not limited to:

- "Students have the responsibility to attend class and know their appropriate academic requirements."
- "Students …are expected to conduct themselves in a manner supportive of the educational mission of the institution. Integrity, respect for the person and property of others are deemed fundamental to membership in this University community".
- "Plagiarism is the use of someone else's language, ideas, information, or original material without acknowledging the source. Examples of plagiarism: (1) Paper is downloaded from an internet source and/or obtained from a paper mill; (2) paper contains all or part of the writings of another person (including another student), copied without citation; (3) paper contains passages that were cut and pasted from an internet source, **without citation**."
- The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. **The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort**.

Academic Integrity on Quizzes, Exams, Homework and Lab Assignments
- There is to be no collaboration on quizzes and exams. This must be your own work. Students who either give or get help will receive a grade of zero (0) for the quiz or exam.
- The labs and homework assignments are to be done separately by each student. While it is permissible to "discuss" problems with other students, copying solutions will result in a grade of zero (0) for all copied solutions.
- The presumptive sanction for a first offense is course failure, accompanied by the transcript notation "Violation of the Academic Integrity Policy."

STUDENTS WITH DISABILITIES
Our community values diversity and seeks to promote meaningful access to educational opportunities for all students. Syracuse University and I are committed to your success and to supporting Section 504 of the Rehabilitation Act of 1973 as amended and the Americans with Disabilities Act (1990). This means that in general no individual who is otherwise qualified shall be excluded from participation in, be denied benefits of, or be subjected to discrimination under any program or activity, solely by reason of having a disability.

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu, located at 804 University Avenue, room 309, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities "Accommodation Authorization Letters," as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.
You are also welcome to contact me privately to discuss your academic needs although I cannot arrange for disability-related accommodations.