Construction Management Program

California State University, Sacramento

CM 30
Engineering Mechanics: Statics

Course Syllabus
Spring 2009

Instructor: Professor Mikael Anderson, PE

Lecture Section I: Monday/Wednesday, 9:00 AM – 10:15 AM (ARC 1009)

Lecture Section II: Tuesday/Thursday, 12:00 PM – 1:15 PM (RVR 1012)

Telephone: (916) 278-5990
CM Office: (916) 278-6616
Fax: (916) 278-7957
Email **(Best way to reach me)** – anderson@ecs.csus.edu

Office Hours: RVR 4019
Monday, Tuesday, Wednesday, Thursday 10:30 AM. – 11:30 AM
or by appointment

CM 30 - Engineering Mechanics - Statics

COURSE DESCRIPTION:
An introduction to the analysis and solution of engineering design problems related to particles and rigid bodies in equilibrium. Primary concepts include units, vectors, equilibrium of particles and rigid bodies, forces, force systems, analysis of trusses and frames, shear and moment diagrams, moment of inertia, and friction. **3 units.**

PREREQUISITES:
The prerequisite courses for this class, which must have been completed with a C- or better grade, include CM 21, MATH 26A, MATH 26B (may be taken concurrently), and PHYS 5A. One hundred series CM courses are limited to students whose upper division standing has been approved by the Program Coordinator, or by special permission of the course instructor and the Program Coordinator.

ACADEMIC HONESTY & GRADING SYSTEM:
All students are subject to the policies described in the University Catalogue. In particular, students should be familiar with policies described on pages 81–91, pages 98–106, and pages 328-331 of the 2008-2010 CSUS Catalogue.

Giving aid to a student during an exam or taking information from another student or student's exam constitutes academic dishonesty. Students caught cheating during an exam will receive a failing grade in the course and can be dismissed from the university. Students are encouraged to work together to solve homework problems, but **copying is obviously prohibited.**

Grades will be assigned based on the student's performance as measured by the assigned homework, midterm exams, and final exam. Grading shall be in accordance with the University's grading policy as outlined in the section entitled "Grading System" in the current copy of the University catalog.

Grade Scale:
A: 90-100 B: 80-89
C: 70-79 D: 60-69
F: <60

Homework	20%
Bridge Project	10%
Midterm Exam #1	20%
Midterm Exam #2	20%
Final Exam	30%

*Students achieving overall percentages as shown above are guaranteed grades as indicated. Actual cutoffs may be lower.

COURSE OBJECTIVES:
The purpose of this course is for students to develop an understanding of forces and loads on structures. The students will be able to mathematically transfer these loads and forces to individual members and reaction points of the structure, which will be used to design the structural components in subsequent construction management classes.

SPECIFIC EDUCATIONAL OUTCOMES:
At the conclusion of the class, students should be able to:

- Convert units within SI and US customary systems.
- Convert units between SI and US customary systems.
- Calculate quantities with appropriate numerical accuracy.
- Explain the six fundamental principles of elementary mechanics.
- Solve problems using fundamental principles in a logical and systematic way.\
- Idealize problems using mathematical models.
- Draw free body diagrams.
- Solve force vector problems using force triangles and trigonometric identities.
- Apply equilibrium equations to solve 2D and 3D particle and rigid body problems for forces.
- Determine support reactions and internal forces in 2D and 3D structures.
- Determine the properties of areas, volumes, and masses (center of gravity and centriod).
- Analyze statically determinate trusses by the Method of Joints, Method of Sections, and Maxwell's Diagram
- Calculate internal forces and moments in statically determinate frames and machines.
- Construct shear and bending moment diagrams for statically determinate beams.
- Calculate moment of inertia and radii of gyration for simple and composite areas.
- Solve problems using Coulomb friction.
- Computer applications as assigned for any of the above objectives.

TEXT:
Beer and Johnston, *Mechanics for Engineers, Statics*, 5th or 4th Ed., McGraw-Hill, New York, 2008 (5th Ed.) or 1987 (4th Ed.). **(Required)**

COURSE ORGANIZATION & EVALUATION:

Lecture Sessions

Attendance is strongly recommended. Lecture sessions will be one hour and fifteen minutes in length, and held two times per week. Classes will be devoted to the presentation of lecture topics, a brief review of the assignments, administering exams, and addressing individual questions as time allows. To maximize learning, you are encouraged to participate actively in lecture. You will also have the opportunity to work in small groups to solve problems inside and outside of the classroom.

Course Web Page

A CM 30 course web page will be developed through the CSUS SacCT. It is **important** for you to have a SacLink account to utilize the tools of this course web page. You will

be expected to check your Saclink email and the course web page regularly (i.e., daily) for important class announcements, homework assignments & solutions, and other information. You must send all email to me during the semester with **"CM30" somewhere in the "subject line".** Email without this designation will not be recognized or responded to (i.e., I will assume that it has not been submitted).

Classroom Interruptions

The lecture sessions should be treated in a professional manner, as you would behave during a meeting with a client/contractor. All cellular phones and pagers to be turned off prior to entering lecture sessions and exams. Use of classroom computers during the lecture will also not be allowed. Any violation of these warnings will result in dismissal of the student from that day's lecture.

Homework Policy

Homework problems will be assigned regularly. Assignments must be turned in at the **beginning** of class on the due date, typically two periods after they have been assigned. A maximum of 2 late homeworks will be accepted at the beginning of the next class period, with a **20% penalty** for the 1st late homework and **50% penalty** for the 2nd late homework. No homework may be submitted after an assignment is returned or after solutions are provided.

Homework must be neat and organized, and completed using a straight edge and engineering paper (front side only). Final answers must be boxed or underlined for clarity and **engineering units must be used in solving problems and shown on final answer to receive credit**. Homework sheets must be stapled, with name at the top of each page.

Homework will be reviewed for completion of all assigned problems, but not all of the assigned problems will necessarily be graded. However, solutions of all problems will be posted on SacCT and should be reviewed.

Exams Policy

Two seventy-five minute midterm exams will be given as noted on the exam schedule below. These midterm exams will be returned for review in class, but will be collected and remained on file in the instructor's office for a minimum period of one year. Any appeal on the scoring of an exam must be made at the first lecture period following return of the midterm exam.

A two hour final exam will be given as determined by the University Final Exam Schedule (noted on the exam schedule below). Final exams will not be returned, but will remain on file in the instructor's office for a minimum period of one year. During this time, the student may schedule an appointment with the instructor to review his/her final exam.

Exam Dates (tentative)

Midterm Exam #1	Wed/Thur, March 4 & 5, 2009	(Week 6)
Midterm Exam #2	Wed/Thur, April 22 & 23, 2009	(Week 12)
Final Exam	Dates & Times as noted on CSUS Final Exam Schedule	

Students may bring one 8.5 x 11 sheets (both sides) to the first exam and an additional sheet for each subsequent exam. These sheets must be your own hand written notes. The instructor will collect and review these sheets. Makeup exams will be given only if *prior permission* is granted for extreme situations, such as valid medical reasons.

Evaluations

Students are encouraged to provide constructive feedback to the instructor during the semester through "student representatives" and will also formally evaluate the instructor during the last week of class using the standard evaluation form.

CM 30 - Course Outline (Tentative)
Spring 2009

Week	Lecture	Topic	Reading Assignment
1	1	Introduction	Chapter 1
	2	Vectors, Components of Forces	2.1 – 2.8
2	3	Particle Equilibrium	2.9 – 2.16
	4	Forces in Space	2.9 – 2.16
3	5	Rigid Bodies in 2-D, Couples,	3.1 – 3.12
	6	**NO CLASS** – ASC Student Competition – Sparks, NV	
4	7	Equilibrium	3.13 – 3.16
	8	Equilibrium	3.17 – 3.20
5	9	Rigid Bodies in 3-D	4.1 – 4.6
	10	Equilibrium of Rigid Bodies in 3-D	4.7 – 4.9
6	11	Equilibrium of Rigid Bodies in 3-D	4.7 – 4.9
	12	**MIDTERM EXAM #1**	
7	13	Centroids of Areas and Lines	5.1 – 5.5
	14	Theorems of Pappus-Guldinus	5.7
8	15	Distributed Loads	5.8 – 5.9
	16	Centroids of Volumes	5.10 – 5.13
9	17	Analysis of Trusses:	6.1 – 6.8
	18	Method of sections, joints, Maxwell	
10	19	File Folder Bridge Project	Handouts
	20	Analysis of Frames and Machines **	6.9 – 6.13
11	21	Internal Forces	7.1 – 7.2
	22	Internal Forces	7.1 – 7.2
12	23	Shear & Moment Diagrams	7.3 – 7.6
	24	**MIDTERM EXAM #2**	
13	25	Shear & Moment Diagrams	7.3 – 7.6
	26	Shear & Moment Diagrams	
14	27	Shear & Moment Diagrams	7.3 – 7.6
	28	Friction**	8.1 – 8.4
15	29	Moment of Inertia	9.1 – 9.7
	30	Moment of Inertia	9.1 – 9.7

** Extent of coverage depends on time available
Note: Some sections that are starred (*) in the book will be skipped.

DISCLAIMER:
The instructor reserves the right to adjust the scope of the course, including number and timing of exams, as necessary.