MAE 101, Statics and Strength of Materials

University of California, Los Angeles

Lecture Instructor **Professor Vijay Gupta**
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Class Meetings

Lectures
Mondays and Wednesdays, 10 AM to 11:50 AM, Royce 362

Discussion Sessions
Friday
Dis 1A - 12:00 PM to 1:50 PM, Public Affairs Building 2270
Dis 1B - 2:00 PM to 3:50 PM, Geology Building 3656

Office Hours

Professor Vijay Gupta
Scheduled by appointment via email.

Pratyush Srivastava
Tuesdays 3:00 PM to 5:00 PM, Room 43-147 EIV

Masato Koizumi
Mondays 2:00 PM to 4:00 PM, Room 43-147 EIV

Final Exam Tuesday, December 10, 11:30 AM to 2:30 PM

Pre-requisites Math 31A and 31B, Physics 1A

Text Anthony Bedford, Wallace Fowler, and Kenneth Liechti, *Statics and Mechanics of Materials*, Prentice Hall, New Jersey.

Grade

Examination
Two in-class mid-term exams (closed book) will be given that will make up 40% of the course grade. The final exam will be an in-class closed-book examination, and will count 40% towards the final grade in the course. It is important that each student work out these exams without any assistance from others. To do otherwise would constitute a violation of the honor principle.

Homework
Sets of homework problems will be assigned every Wednesday in class and will be due in class on the following Wednesday *before* class begins. Solutions to the homework problems will be posted on the course website the day the homework is due. *Homework will make up 20% of the final course grade.* It is important that each student do his/her own homework and submit his/her own solutions. You may discuss problems with the professor, teaching assistants or other students, but the work submitted should represent your own efforts. Major contributions should be acknowledged.
LATE HOMEWORK WILL NOT BE ACCEPTED

To summarize the grading scheme, Homework 20%, Midterms 40%, Final Exam 40%

Brief Overview of the Course

The aim of this course is to equip the students with the fundamental concepts that form the basis for more advanced courses in the fields of solid mechanics and mechanics of materials. These latter courses allow one to design structural and machine elements in the fields of civil, mechanical and aerospace engineering. The course will also introduce analysis and design of basic structural elements such as axial truss members and beams. Various examples will be taken to demonstrate the basic principles, including those from the exciting field of biomechanics. The emphasis of the course will be to develop an intuitive and physical understanding of deformations and their subsequent representation through mathematical equations.

Course Outline

Review of Vectors

Components, rules of vector algebra, transformation properties (1 hour).

Forces and Moments

Vector representations in two and three dimensions, moments about a point and a line (torque), couples (2 hours).

Resultants

Concurrent and non-concurrent forces, equivalent systems, equilibrium equations (2 hours).

Free Body Diagrams

Loaded objects in equilibrium, support reactions, statically determinant and indeterminate systems (4 hours).

Trusses, Frames and Machines

Analysis of structures and structural members (4 hours).

Frictional Forces

Coefficients of friction, application to wedges, bearings, clutches and belts (2 hours).

Distributed Loads

Resultants, centroids of areas and volumes, area moments of inertia, parallel axis theorem (3 hours).

Internal Forces in Loaded Beams

Concentrated and distributed loads, internal forces, shear forces and bending moments and their diagrams (10 hours).

Stresses in Beams

Symmetric beams in extension, bending, torsion and flexure (6 hours).

Deflection of Beams

(4 hours).