Department of Civil and Environmental Engineering
CEVE 211 - Engineering Mechanics
Fall 2022

Instructor	Kalil Erazo, Ph.D. Ryon Building B30 (Basement) ke11@rice.edu
Office Hours	Wednesdays 2:30pm-3:30pm
Course Description	The study of equilibrium of static systems, the dynamics of a particle and particle systems, and rigid-body dynamics. The course focuses on the analysis of forces acting on civil structures in static equilibrium. Internal and external reactions in structures modeled as rigid-bodies, such as trusses, beams and frames. Dynamics of systems modeled as a particle. Introduction to rigid-body dynamics.
Pre-Requisites	PHYS 101; MATH 101/102 OR MATH 111/112 MATH 212 (recommended or taken concurrently)
Credits	3
Schedule	11:00AM - 11:50AM MWF KCK 101 (22-AUG-2022 - 2-DEC-2022)
Mode of Instruction	In-person
Textbooks	Engineering Mechanics: Statics. Hibbeler. Pearson (13th or 14th edition)
Additional References	Engineering Mechanics: Statics, Pytel and Kiusalaas. Cengage (3rd or 4th edition) Engineering Mechanics: Dynamics, Pytel and Kiusalaas. Cengage (3rd edition) Engineering Mechanics: Dynamics. Hibbeler. Pearson (13th or 14th edition)
Course Website	Canvas (class materials will be posted regularly)
Grading	20% Homework 10% Project 20% Exam 1 20% Exam 2 30% Final Exam

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Teaching Methodology and Grading Policy

- The instructor will use the whiteboard (or a digital notepad for the online version of the class) to write notes each lecture, complemented by visual aids. The lectures will explain the fundamentals of the course and use examples to illustrate the concepts and their application to problems that arise in structural engineering practice. Students are encouraged to participate and ask questions during lectures.
- Homework sets will be assigned regularly throughout the semester. Homework problems will be practice-oriented, focusing on engineering applications of the concepts of the class.
- Homework and reading assignments will be posted in the course website (CANVAS).
- All written assignments will be submitted in digital form in CANVAS. Assignments will be delivered as a single PDF file. Problems should be clearly identified, showing all work. A guideline to submit written work will be provided in CANVAS.
- Late assignments will not be accepted without the instructor's prior approval. Hardship cases will be considered on an individual basis.
- Cooperative effort aimed at understanding the material and assignments is encouraged. However, you may only submit work that you have completed individually. Submitting work completed by others or from a solutions manual is a violation of the Rice Honor Code.
- Consistently absent students without a justifiable cause may be penalized with a reduction of homework grade at the discretion of the instructor.
- Final grades will be based on the following scale

A	92 – 100	C	71 - 74
A-	89 – 91	C-	69 - 70
B+	86 – 88	D+	66 - 68
B	81 – 85	D	63 - 65
B-	78 – 80	D-	60 - 62
C+	75 – 77	F	< 60

Final Grades might be curved up at the discretion of the instructor depending on class performance

Course Objectives and Outcomes

The objective of this course is to study the fundamental concepts of statics and dynamics in civil structures such as bridges, buildings, nuclear power plants, and offshore structures. During their design life structures are subjected to forces such as their own weight and the weight of equipment, forces induced by wind, earthquakes, waves, and explosions (among others). The analysis of the effects of these forces is needed to properly design structures to safely resist these effects without failing or collapsing.

After completing this course students will be able to

- Analyze the forces induced in structures due to different loading conditions.
- Calculate support reactions and internal forces on trusses, beams and frames using equilibrium.

- Locate the center of gravity and calculate the weight of volumes.
- Calculate the centroid and moment of inertia of area sections.
- Characterize the dynamic behavior of particles in rectangular and curvilinear coordinates.
- Use Newton's second law to model the dynamic behavior of systems modeled as particles.
- Use the equations of motion of rigid-bodies to characterize the behavior of dynamic systems in structural engineering applications.

Course Topics

- *Review of Vectors and their Operations*
- *Introduction to Newtonian Mechanics*
- *Statics*
  - *Forces, force systems and force resultants*
  - *Equilibrium of particles and rigid bodies in the plane and the space*
  - *Application to trusses, beams and frames*
  - *Loads distributed over a line, an area and a volume*
  - *Center of gravity and center of mass*
  - *Area properties (centroid, moments of inertia, radius of gyration)*
- *Dynamics*
  - *Kinematics of a particle in rectangular and curvilinear coordinates*
  - *Kinetics of a particle (Newton's second law)*
  - *Work and energy principles*
  - *Kinematics and kinetics of rigid bodies*

Rice Honor Code

In this course all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of the Rice Honor Code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Disability Support

If you have a documented disability or other condition that may affect your academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 /adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with the instructor to discuss your accommodation needs.

Syllabus Change Policy

This syllabus is subject to change with reasonable advance notice as deemed appropriate by the instructor.