Department of Civil and Environmental Engineering

CIVE 261 - Engineering Mechanics – Dynamics (Fall 2008)

Instructor
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Office hours: MWF 2.00 – 3.00 PM in A205D – Engineering Building, or by appointment

Lectures: MWF 1.00 -1.50 PM, A102 Clark Building
Class website: https://ramct.colostate.edu/

Textbook: Vector Mechanics for Engineers – Dynamics, 8th edition, by F. P. Beer, E. Russell Johnston Jr. and W. E. Clausen, McGraw-Hill, 2007

Course Prerequisite
CIVE 260 - Engineering Mechanics – Statics

Overview

This is an introductory course in engineering mechanics which is concerned with the accelerated motion of a body. The study of dynamics has numerous engineering applications. For example, the structural design of a vehicle such as an automobile or airplane, requires consideration of the motion to which it is subjected. This is true for many other mechanical systems such motors, pumps, turbines etc. Anticipated topics include: particle kinematics, kinetics of particles, kinematic of rigid bodies and kinetics of rigid bodies.

Course Objectives:

By the end of this course, you should expect to be able to:

- Develop a clear understanding of the basic principles that govern the dynamics of particles and rigid bodies.
- Have the ability to apply the knowledge and tools to solve engineering problems

You should also expect to:

- Take responsibility for your learning
  - Read textbook on your own
  - Ask questions from me, your classmates and yourself
  - Turn in excellent assignments demonstrating your knowledge of the solution
- Tap into your existing intuition, strengths, and passion to learn dynamics

- Become an active participant in your dynamics education, taking full advantage of lectures, texts, homework, office hours and everyday life!

COURSE LOGISTICS

Course website: https://ramct.colostate.edu/ The RamCT website will be used to post homework assignments and solutions, practice exams, announcements etc. You can also check your grades online.

Textbook and reading assignments: *Vector Mechanics for Engineers – Dynamics*, 8th edition, by F. P. Beer, E. Russell Johnston Jr. and W. E. Clausen, published by McGraw-Hill, 2007. Reading will be assigned periodically to complement lectures. Students are expected to read the assigned material prior to the corresponding lecture. You are responsible for the material in the assigned sections of the textbook as well as for what is presented in lectures.

Homework: Assignments will be posted weekly on the RamCT class webpage. Please note that reading assignments may be examined via pop-up quizzes. **Home works are due by the end of class every Wednesday**. **No late homework assignments will be accepted except for legitimate reasons acceptable to the instructor**. While you are encouraged to discuss assignments with each other, you may not look or copy anyone else's written work. Your solution to homework problems should:

- Formulate/define the problem
- Indicate the solution procedure clearly
- Draw your conclusions by highlighting the answers with correct units!
- Must be submitted using Engineering paper or letter size white paper.
- Each homework should be stapled, with **CIVE261 – Fall 08, Assignment No., Name and CSUID** written on top of first page. Please write your name on top of all other pages in case bindings get loose.

You are expected to arrange your work in a neat and orderly manner. This will not only help others to understand your work but will aid your thought process.

Exams: There will be 3 midterms and a final exam. Material in the exams will be drawn from lectures and the textbook. Collaboration or copying from others during an exam will not be tolerated and may result in zero credit and referral to Student Conduct Services.

Course Evaluation: Assignments and exams will be weighted as follows:

Homework	20%
Quizzes and other assignments	6%
3 Midterm exams (18% each)	54%
Final Exam	20%

Grading will be assigned according to a traditional grade scale at a minimum, i.e. A=90-100%, B=80-89%, etc.

Makeup exam policy: For folks who can not attend regular exams due to university business duty, serious illness, or family emergency (all with written proof or statement), a makeup exam may be arranged AFTER the regular exam. Please inform the instructor as soon as possible. No exceptions will be made without a legitimate reason and a timely arrangement. There are no make-ups for pop-up quizzes.

Academic Integrity: Academic dishonesty is a serious issue. University rules including academic penalty and further investigation by the university authorities will be strictly enforced in this course. Please review the student handbook for details regarding these rules.

How to survive this course: Find a study group! Take advantage of office hours! If you have a question, ask it. Enjoy the subject and its numerous applications in engineering!

Main Topics

1. Kinematics of particles
    - Basic definitions
    - Rectilinear motion
    - Plane curvilinear motion
    - Relative motion

2. Kinetics of Particles
    - Newton's second law, F = ma
    - Work and Energy
    - Impulse and Momentum

3. Kinematics of rigid bodies
    - Plane motion
    - Rotation
    - Absolute motion
    - Relative motion

4. Kinetics of rigid bodies
    - F = ma
    - Work and Energy
    - Impulse and Momentum

TENTATIVE COURSE SCHEDULE:

Aug. 25 First lecture
Sept. 23 Midterm Exam #1
Oct. 23 Midterm Exam #2
Nov. 21 Midterm Exam #3
Dec. 12 Last lecture
Dec. 15 Final Exam

Week of	Topics	Reading (Text Chapters
Aug. 25	Introduction to Dynamics, Kinematics of Particles - Rectilinear Motion	11.1-11.8
Sept. 1	Kinematics of Particles – Curvilinear motion, x-y coordinates, n-t coordinates, r-θ coordinates	11.9-11.14
Sept. 8	Kinematics of Particles – relative motion, constrained motion. Kinetics of Particles – force, mass and acceleration	11.6, 11.12 12.1-12.3
Sept. 15	Kinetics of Particles – Newton's Second Law, Rectilinear and Curvilinear Motion	12.4-12.8
Sept. 22	**Midterm # 1 (Sept. 23),** Kinetics of Particles - Work and Energy, Kinetic Energy, Potential Energy	13.1-13.6
Sept. 29	Kinetics of Particles – Potential Energy, Linear Impulse and Momentum	13.7-13.10
Oct. 6	Kinetics of Particles – Angular Impulse and Angular Momentum.	12.7, 13.10-13.11
Oct. 13	Kinetics of Particles – Impact, Kinematics of Rigid Bodies – Plane Motion/Rotation	13.12-13.15 15.1-15.3
Oct. 20	**Midterm # 2 (Oct. 23),** Kinematics of Rigid Bodies –Absolute Motion, Relative Velocity and Acceleration	15.4-15.8
Oct. 27	Kinematics of Rigid Bodies – Relative Acceleration, Motion Relative to Rotating Axes	15.9-15.11
Nov. 3	Kinetics of Rigid Bodies – General Equations of Motion, Translation	16.1-16.3
Nov. 10	Kinetics of Rigid Bodies – Fixed-Axis Rotation, General Plane Motion	16.4-16.6
Nov. 17	**Midterm # 3 (Nov. 20),** Kinetics of Rigid Bodies – Work and Energy	17.1-17.4
Nov. 24	**FALL BREAK – NO CLASSES**	
Dec. 1	Kinetics of Rigid Bodies – Work and Energy, Virtual Work, Impulse and Momentum	17.4-17.8
Dec. 8	Kinetics of Rigid Bodies – Impulse and Momentum, Review, **Last lecture on Dec. 12**	17.10
Dec. 15	**Final Exam (7-9 am)**	