

Colorado State University
Department of Civil and Environmental Engineering
Spring 2012
CIVE 261 - Engineering Mechanics-Dynamics (3-0-0)

Course Description:

CIVE261 provides fundamental concepts for most of engineering branches, such as civil, mechanical, electrical and agricultural. The course focuses on the physical/mathematical analysis of the motion of particles and rigid bodies. The course topics are typically interdisciplinary and draw primarily from mathematics, physics and graphics.

Course Objectives:

- (1) Introduce the analysis of dynamic systems encountered in engineering design practice.
- (2) Develop a clear understanding of the basic principles that govern the dynamics of particles and rigid bodies.
- (3) Apply dynamic system analysis to the solution of real-world engineering problems.

Prerequisites: CIVE260 (Engineering Mechanics-Statics).

Instructor:

Domenico Bau, PhD, Assistant Professor, Dept. of Civil and Environmental Engineering, Room B206; phone: 491-6060, email: domenico.bau@colostate.edu; **Office Hours:** Monday-Wednesday, 3:00-4:00 pm.

Textbook: Engineering Mechanics - Dynamics by J.L. Meriam and L.G. Kraige. Sixth Edition, John Wiley & Sons, Inc., 2007.

Class website: <http://ramct.colostate.edu>

Class Schedule and Location: 12:00-12.50PM, MWF; Clark Bldg, Room C144.

Course Organization:

- Readings assignments will be given for each lecture, as described in the “Course Schedule”. Studying the textbook is fundamental to understand the course topics. Ideally, the assigned material should be studied prior to the corresponding lecture or just after the lecture is given. Reading assignments will not necessarily duplicate the lecture material and students are responsible for knowing both the lecture and reading material.
- Homework problems will be assigned weekly and posted on the class webpage. These assignments are crucial develop an ability to visualize physical problems and develop the mathematical procedures that lead to their solution.
- Three Midterm Exams and one Final Exam will be given. Midterms will be evening exams to be held from 5 - 6:50 pm on the specified dates. The final exam will take place as specified in the University calendar.

Homework Guidelines and Policy

- Homework problem solutions should be developed in logical steps and include: a) definition of the problem; b) clear description of the solution procedure; and c) final highlighted (e.g. by underlining or boxing) answers with appropriate units.
- Homework assignments should follow a format similar to that used by professional engineers. Assignments should be written clearly on one side of either blank or engineering paper.
- Diagrams or graphs should be given when necessary. The diagrams and graphs should be clearly labeled and contain enough information so that they can stand alone.
- Each homework assignments will consist of at least three problems. For credit, three of these problems are to be turned in. However, only one of the three problems will be graded.
- Homework assignments are due by the end of class every Friday, unless differently specified.
- Thirty percent of the total possible points will be deducted for each day that an assignment is late.
- Students can work in groups on homework assignments; however, each student must write his/her own homework.

Course Grading

The grading breakdown is as follows:

- Homework 35%
- Midterm Exams (3) 15% each
- Final Exam 20%

Term grades for this course will use the \pm grading system as described in the CSU catalog.

Academic Integrity Policy

This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. The full Catalog may be downloaded from the link <http://catalog.colostate.edu/>. The Academic Integrity Policy is stated on pages 7-8 of Section 1.6 (Policies and Guiding Principles). Students are invited to read carefully this section.

- In homework assignments, when information from reference materials (e.g. textbooks, handouts, article, and web sites) is drawn upon, the reference must be properly cited.
- Plagiarism, copying or using scoop will not be tolerated.
- No Honor Pledge will be used in this course.

Course Outline

Lecture	Date	Topics	Textbook Sections	Pages
1	1/18	Introduction to Dynamics	1.1-1.7	3-20
2	1/20	Kinematic of Particles, Rectilinear Motion	2.1-2.2	21-39
3	1/23	Plane Curvilinear Motion: x,y coordinates	2.3-2.4	40-54
4	1/25	Plane Curvilinear Motion: n,t coordinates	2.5	55-67
5	1/27	Plane Curvilinear Motion: r,q coordinates	2.6	68-80
6	1/30	Space Curvilinear Motion	2.7	81-90
7	2/1	Space Curvilinear Motion	2.7	81-90
8	2/3	Relative Motion	2.8	91-100
9	2/6	Constrained Motion	2.9	101-117
10	2/8	Kinetic of Particles – Force, Mass, Acceleration	3.1-3.2	119-124
11	2/10	Newton's 2nd Law – Equations of Motion	3.3-3.4	124-139
12	2/13	Curvilinear Motion	3.5	140-156
13	2/15	Curvilinear Motion	3.5	140-156
-	2/15	First Midterm Exam		
14	2/17	Work and Energy, Kinetic Energy	3.6	157-176
15	2/20	Linear Springs, Work, Energy Equation	3.6	157-176
16	2/22	Conservative Force Fields	3.7	177-193
17	2/24	Potential Energy	3.7	177-193
18	2/27	Potential Energy	3.7	177-193
19	2/29	Linear Impulse and Linear Momentum	3.8-3.9	193-208
20	3/2	Linear Impulse and Linear Momentum	3.9	193-208
21	3/5	Angular Impulse and Angular Momentum	3.10	209-220
22	3/7	Angular Impulse and Angular Momentum	3.10	209-220
23	3/9	Impact	3.11-3.12	221-223
Spring Break Recess				
24	3/19	Impact	3.11-3.12	221-223
25	3/21	Translation and Rotation	5.1-5.2	331-343
-	3/21	Second Midterm Exam		
26	3/23	General Motion	5.3	344-355
27	3/26	Relative Velocity	5.4	356-370
28	3/28	Relative Velocity	5.4-5.5	356-380
29	3/30	Relative Acceleration	5.6	381-394
30	4/2	Relative Acceleration	5.6	381-394
31	4/4	Motion Relative to Rotating Axes	5.7	395-410
32	4/6	Motion Relative to Rotating Axes	5.7	395-410
33	4/9	Motion Relative to Rotating Axes, Coriolis Acceleration	5.7	395-410
34	4/11	Plane Kinetics of Rigid Bodies - Introduction	6.1	419-425
-	4/11	Third Midterm Exam		
35	4/13	General Equation of Motion	6.2	419-425
36	4/16	Translation, Fixed-Axis Rotation	6.3-6.4	425-453
37	4/18	General Plane Motion	6.5	454-470
38	4/20	General Plane Motion	6.5-6.6	454-470
39	4/23	Work-Energy Relations	6.6	471-488
40	4/25	Work-Energy Relations	6.6	471-488
41	4/27	Impulse and Momentum	6.8	498-514
42	4/30	Impulse and Momentum	6.8	498-514
43	5/2	Impulse and Momentum	6.8	498-514
44	5/4	Review	-	
	5/8	Final Exam – 4.10-6.10PM		

