

## CIVE261 Engineering Mechanics - Dynamics

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### Instructor

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Professor

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*Office Hours:* MWF 1:00 PM – 2:00 PM – A222 Engineering Bldg.

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### Textbooks and References

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

[http://www.engr.colostate.edu/~ramirez/ce\\_old/classes/ce261\\_Ramirez/CE261-new.htm](http://www.engr.colostate.edu/~ramirez/ce_old/classes/ce261_Ramirez/CE261-new.htm)

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### Course Objectives

This course introduces engineering students to the analysis of dynamic systems encountered in engineering design practice. As a result, students will develop a clear understanding of the basic principles that govern the dynamics of particles and rigid bodies; as well as an ability to use that understanding in the solution of engineering problems.

### Methodology

Students will be given weekly reading assignments and homework problems. Reading assignments and homework problems are fundamental to the student's success in understanding the material. In particular, the homework problems will develop the student's ability to visualize the nature of the physical problem at hand and to develop the corresponding mathematical description leading to a solution. Students are expected to read the assigned material prior to the corresponding lecture.

### Homework

Homework assignments will be posted weekly on the web page for the class. Three or more problems will be assigned each week, three of which must be turned in for credit. Only one of the three problems will be graded. **Homework assignments are due by the end of class every Friday. No late homework assignments will be accepted.**

Your solutions to homework problems should:

- a) include definition of the problem;
- b) show clearly the solution procedure; and
- c) present and highlight (i.e., in a box) the answers with appropriate units.

You are encouraged to work with others; however, the work you turn in must be your own.

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## Topics

### Kinematics of particles

Rectilinear Motion  
Plane curvilinear motion  
Space curvilinear motion  
Relative motion

### Kinetics of particles

Newton's Second Law: Force, Mass and Acceleration  
Work and Energy  
Impulse and Momentum

### Kinematics of rigid bodies

Rotation  
Absolute motion  
Relative motion

### Kinetics of rigid bodies

Force, Mass and Acceleration  
Work and Energy  
Impulse and Momentum

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## Course Evaluation

Homework and other assignments	20%
3 Midterm Exams @20% each	60%
Final Exam	20%

Midterm exams will be **evening** exams to be held from 5 - 6:30 pm on the specified dates.

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## Academic Integrity and Honor Pledge

This course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. Accordingly, we will use an honor pledge as indicated below.

The honor pledge will be:

*"I pledge that I have not given, received, or used any unauthorized assistance."*

*"I pledge that I will not give, receive, or use any unauthorized assistance."*

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## Course Prerequisites

CIVE 260 Engineering Mechanics - Statics;

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## Schedule

Lecture MWF 12:00 PM - 12:50 PM – E206 Engineering Building

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<b>Engineering Mechanics - Dynamics</b>				
	<b>Date</b>	<b>Topic</b>	<b>Sections</b>	<b>Pages</b>
1	Jan 18	<b>Chapter 1: Introduction to Dynamics</b>	1/1 - 1/7	3 - 20
2	Jan 20	<b>Chapter 2: Kinematics of Particles</b> - Rectilinear Motion	2/1 - 2/2	21 - 39
3	Jan 23	Plane Curvilinear Motion - x, y coordinates	2/3 - 2/4	40 - 54
4	Jan 25	Plane Curvilinear Motion - n, t coordinates	2/5	55 - 67
5	Jan 27	Plane Curvilinear Motion - n, t coordinates	2/6	68 - 80
6	Jan 30	Plane Curvilinear Motion - r, q coordinates	2/7	81 - 90
7	Feb 1	Plane Curvilinear Motion - r, q coordinates	2/7 - 2/8	81 - 90
8	Feb 3	Relative Motion	2/8	91 - 100
9	Feb 6	Constrained Motion	2/9	10 - 117
10	Feb 8	<b>Chapter 3: Kinetics of Particles</b> - Force, Mass and Acceleration	3/1 - 3/2	119 - 124
11	Feb 10	Newton's Second Law - Equation of Motion - Rectilinear Motion	3/3 - 3/4	124 - 139
12	Feb 13	Curvilinear Motion	3/5	140 - 156
13	Feb 15	Curvilinear Motion	3/5	140 - 156
	<b>Feb 15</b>	<b>First Mid-term Exam</b>		
14	Feb 17	Work and Energy - Kinetic Energy	3/6	157 - 176
15	Feb 20	Linear Springs - Work-Energy Equation	3/6	157 - 176
16	Feb 22	Conservative Force Fields	3/7	177 - 193
17	Feb 24	Potential Energy	3/7	177 - 193
18	Feb 27	Potential Energy	3/7	177 - 193
19	Feb 29	Linear Impulse and Linear Momentum	3/8 - 3/9	193 - 208
20	Mar 2	Linear Impulse and Linear Momentum	3/9	193 - 208
21	Mar 5	Angular Impulse - Angular Momentum	3/10	209 - 220
22	Mar 7	Angular Impulse - Angular Momentum	3/10	209 - 220
23	Mar 9	Impact	3/11 - 3/12	221 - 233
	Mar 12	<b>Spring Break - No Classes</b>		
	Mar 14	<b>Spring Break - No Classes</b>		
	Mar 16	<b>Spring Break - No Classes</b>		
24	Mar 19	Impact	3/11 - 3/12	221 - 233
25	Mar 21	<b>Chapter 5: Plane Kinematics of Rigid Bodies</b> - Translation - Rotation	5/1 - 5/2	331 - 343
	<b>Mar 21</b>	<b>Second Mid-term Exam</b>		
26	Mar 23	General Motion	5/3	344 - 355
27	Mar 26	Relative Velocity	5/4	356 - 370
28	Mar 28	Relative Velocity	5/4 - 5/5	356 - 380
29	Mar 30	Relative Acceleration	5/6	381 - 394
30	Apr 2	Relative Acceleration	5/6	381 - 394
31	Apr 4	Motion Relative to Rotating Axes	5/7	395 - 410
32	Apr 6	Motion Relative to Rotating Axes	5/7	395 - 410
33	Apr 9	Motion Relative to Rotating Axes - Coriolis Acceleration	5/7	395 - 410
34	Apr 11	<b>Chapter 6: Plane Kinetics of Rigid Bodies</b> - Introduction	6/1	419 - 425
	<b>Apr 11</b>	<b>Third Mid-term Exam</b>		
35	Apr 13	General Equation of Motion	6/2	419 - 425
36	Apr 16	Translation - Fixed-Axis Rotation	6/3 - 6/4	425 - 453
37	Apr 18	General Plane Motion	6/5	454 - 470
38	Apr 20	General Plane Motion	6/5 - 6/6	454 - 470
39	Apr 23	Work-Energy Relations	6/6	471 - 488
40	Apr 25	Work-Energy Relations	6/6	471 - 488
41	Apr 27	Impulse and Momentum	6/8	498 - 514
42	Apr 30	Impulse and Momentum	6/8	498 - 514
43	May 2	Impulse and Momentum	6/8	498 - 514
44	May 4	Review		
	<b>May 10</b>	<b>Final Exam - 7:30 am - 9:30 am</b>		

