Hydrologic Science and Engineering
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CIVE261 Engineering Mechanics - Dynamics

Instructor

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

Textbooks and References

Vector Mechanics for Engineers - Dynamics by Ferdinand P. Beer, E. Russell Johnston, Jr and William E. Clausen. Eighth Edition, McGraw Hill, 2007.

http://www.engr.colostate.edu/~ramirez/ce_old/classes/ce261_Ramirez/CE261-new.htm

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 Wednesday**. **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.

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

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.

Course Prerequisites

CIVE 260 Engineering Mechanics - Statics;

Schedule

Lecture MWF 12:00 PM - 12:50 PM – A204 Clark

		Engineering Mechanics - Dynamics		
	Date	**Topic**	**Sections**	**Pages**
1	Jan 21	**Chapter 11: Kinematics of Particles** - Introduction to Dynamics	11.1 - 11.2	602 - 616
2	Jan 23	Rectilinear Motion	11.3 - 11.5	616 - 629
3	Jan 26	Rectilinear Motion - Constrained Motion	11.3 - 11.6	616 - 630
4	Jan 28	Plane Curvilinear Motion - x, y coordinates	11.9 - 11.12	641 - 645
5	Jan 30	Plane Curvilinear Motion - Relative motion	11.9 - 11.12	641 - 662
6	Feb 2	Plane Curvilinear Motion - n, t coordinates	11.13	663 - 665
7	Feb 4	Plane Curvilinear Motion - n, t coordinates	11.13	663 - 665
8	Feb 6	Plane Curvilinear Motion - r, q coordinates	11.14	666 - 683
9	Feb 9	Plane Curvilinear Motion - r, q coordinates	11.14	666 - 683
10	Feb 11	**Chapter 12: Kinetics of Particles** - Newton's Second Law	12.1 - 12.3	692 - 695
11	Feb 13	Newton's Second Law - Equation of Motion - Rectilinear Motion	12.4 - 12.6	695 - 705
12	Feb 16	Curvilinear Motion	12.4 - 12.6	695 - 705
	Feb 17	**First Mid-term Exam - 5:00 - 6:30 PM**		
13	Feb 18	Angular Momentum - Central Force Motion	12.7 - 12.9	718 - 725
14	Feb 20	**Chapter 13: Kinetics of Particles** - Energy and Momentum Methods	13.1 - 13.3	756 - 770
15	Feb 23	Linear Springs - Work-Energy Equation	13.1 - 13.5	756 - 770
16	Feb 25	Conservative Force Fields - Potential Energy	13.6 - 13.9	781 - 792
17	Feb 27	Potential Energy	13.6 - 13.9	781 - 792
18	Mar 2	Potential Energy	13.6 - 13.9	781 - 792
19	Mar 4	Principle of Linear Impulse and Linear Momentum	13.10 - 13.11	805 - 812
20	Mar 6	Linear Impulse and Linear Momentum	13.10 - 13.11	805 - 812
21	Mar 9	Direct Central Impact	13.12 - 13.14	820 - 833
22	Mar 11	Oblique Central Impact	13.12 - 13.15	820 - 833
23	Mar 13	**Chapter 14: Kinetics of Systems of Particles** - Newton's Second Law	14.1 - 14.4	856 - 860
	Mar 16	**Spring Break – No Classes**		
	Mar 18	**Spring Break – No Classes**		
	Mar 20	**Spring Break – No Classes**		
24	Mar 23	Linear and Angular Momentum - Work and Energy	14.5 - 14.9	860 - 880
	Mar 24	**Second Mid-term Exam - 5:00 - 6:30 PM**		
25	Mar 25	**Chapter 15: Plane Kinematics of Rigid Bodies** - Translation - Rotation	15.1 - 15.2	916 - 924
26	Mar 27	Translation - Rotation	15.1 - 15.4	916 - 924
27	Mar 30	General Motion - Relative Velocity	15.5 - 15.6	932 - 938
28	Apr 1	Relative Velocity	15.5 - 15.6	932 - 938
29	Apr 3	Relative Acceleration	15.7 - 15.8	945 - 963
30	Apr 6	Relative Acceleration	15.7 - 15.8	945 - 963
31	Apr 8	Motion Relative to Rotating Axes	15.10 - 15.11	971 - 978
32	Apr 10	Motion Relative to Rotating Axes	15.10 - 15.11	971 - 978
33	Apr 13	Motion Relative to Rotating Axes - Coriolis Acceleration	15.10 - 15.11	971 - 978
	Apr 14	**Third Mid-term Exam - 5:00 - 6:30 PM**		
34	Apr 15	**Chapter 16: Plane Kinetics of Rigid Bodies** - Introduction	16.1 - 16.2	1026 - 1027
35	Apr 17	General Equation of Motion	16.1 - 16.2	1026 - 1027
36	Apr 20	Translation - Fixed Axis Rotation	16.3 - 16.4	1026 - 1031
37	Apr 22	General Plane Motion	16.4 - 16.7	1030 - 1039
38	Apr 24	Constrained Plane Motion	16.8	1051 - 1061

39	Apr 27	**Chapter 17: Plane Kinetics of Rigid Bodies** -Energy and Momentum Methods	17.1 - 17.3	1082 - 1084
40	Apr 29	Work-Energy Relations	17.4 - 17.7	1084 - 1094
41	May 1	Work-Energy Relations	17.4 - 17.7	1084 - 1094
42	May 4	Impulse and Momentum	17.8 - 17.10	1104 - 1111
43	May 6	Impulse and Momentum	17.8 - 17.10	1104 - 1111
44	May 8	Review		
	May 11	**Final Exam - Room A204 Clark - 7:00 - 9:00 am**		