ENGR 80 DYNAMICS

Catalog Data: **ENGR 80: Dynamics (Credit Units: 4) W, Summer.** Introduction to the kinetics and dynamics of particles and rigid bodies. The Newton-Euler, Work/Energy, and Impulse/Momentum methods are explored for ascertaining the dynamics of particles and rigid bodies. An engineering design problem using these fundamental principles is also undertaken. Prerequisites: Mathematics 2D and Physics 7B. Same as CEE80 and MAE80. (Design units: 0.5)

Textbook: Beer and Johnston, *Vector Mechanics for Engineers: Dynamics,* 7th Edition, McGraw-Hill, 2004.

References:

Coordinator: John C. LaRue

Course Outcomes: Students will be able to:
Identify and formulate kinetics and dynamics problems.
Use the Newton-Euler method to solve dynamics problems of particles and rigid bodies.
Use the work/energy method to solve dynamics problems of particles and rigid bodies.
Use the impulse/momentum method to solve dynamics problems of particles and rigid bodies.
Use the combination of the above methods to solve dynamics problems of particles and rigid bodies.
Apply the fundamentals learned from this class to design an engineering component and/or system.

Prerequisites By Topic: Physics - Newtonian mechanics
Math - calculus through multiple integration

Lecture Topics: Kinematics of particles (1 week)
Kinetics of particles: Equations of motion, Newton's Second Law (1 week)
Kinetics of particles: Work and energy, impulse and momentum (2 weeks)
Systems of particles (1 week)
Kinematics of rigid bodies in plane motion (2 weeks)
Kinetics of rigid bodies in plane motion: Equations of motion, Newton's Second Law (1 week)
Kinetics of rigid bodies in plane motion: Work and energy, impulse and momentum (2 weeks)

Class Schedule: Each class meets 3 hours per week for 10 weeks and students are assigned to a 1 hour discussion session per week.

Computer Usage: Problem solving software made available with the textbook.

Laboratory Projects:

Professional Component: Contributes to the design experience and Engineering Topics courses of Civil Engineering and Environmental Engineering majors.

Relationship to Program Outcomes: CE - The course relates to Program Outcomes a, c, e, and g as http://undergraduate.eng.uci.edu/degreeprograms/civil/mission
EnE - The course relates to Program Outcomes a, c, e, and g as stated at:
http://undergraduate.eng.uci.edu/degreeprograms/environmental/mission

Design Content Description

Approach: Students learn the engineering design concept and process in the context of an integrative design project that constitutes several weeks of the course. In this assignment, teams of 2-4 students are tasked with designing an engineering component and/or system. Students must apply both technical and creative skills to develop a conceptual design and then apply analysis skills to ensure that the design is workable. The concept and process of design are integrated throughout the entire 10 weeks of lectures. Oral presentations are also given in class by each team. Each team also submits a written report.

Lectures: 100%

Laboratory Portion: %

Grading Criteria:

Homework:	10%
Midterm 1:	20%
Midterm 2:	20%
Design Project:	15%
Final Exam:	35%
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: ____credit units or ___%
Engineering Science: __3.5__credit units or _88__%
Engineering Design: __.5__credit units or __12_%

Prepared by: John C. LaRue **Date:** July 2006

CEP Approved: Summer 2001