

MAE 145 THEORY OF MACHINES AND MECHANISMS

(Required for ME; Elective for MSE)

Catalog Data: **MAE 145: Theory of Machines and Mechanisms (Credit Units: 4) S.** Presents the basic mathematical theory of machines. Focuses on the principles of cam design, gearing and gear train analysis, and the kinematic and dynamic analysis of linkages, together with an introduction to robotics. Prerequisites: Engineering MAE80; Mathematics 2J. (Design units: 0)

Textbook: Waldron, K.J. and Kinzel, G. *Kinematics, Dynamics and Design of Machinery*, 2nd Edition, John Wiley & Sons, 2004.

References:

Coordinator: J. Michael McCarthy

Course Outcomes: Students will:
Calculate position, velocity and acceleration of elements of planar slider crank and four-bar linkages.
Calculate the speed ratio of compound and planetary gear trains.
Calculate displacement, velocity and acceleration of standard displacement diagrams, and generate standard cam profiles.

Prerequisites By Topic: Engineering Dynamics
Introduction to Linear Algebra

Lecture Topics: Machines and Mechanical Advantage
Linkage Analysis
Linkage Design
Cam Design
Robotics
Gears
Gear Trains
Static Force Analysis
Virtual Work, Lagrange's Equations

Class Schedule: Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.

Computer Usage: Mathematica software is used to facilitate problem solutions. Computer laboratories are available with this software.

Laboratory Projects:

Professional Component: Contributes toward the Mechanical Engineering Topics courses.

Relationship to Program Outcomes: This course relates to Program Outcomes a, c, e, and k; with additional Mechanical Engineering outcomes 3 and 4 as stated at:
<http://undergraduate.eng.uci.edu/degreeprograms/mechanical/mission>

Design Content Description*Approach:**Lectures:**Laboratory Portion:***Grading Criteria:**

Each assignment is worth 30 points and each exam is 100 points for a total of 350 for the class. The final grade will be determined from the percentage of points, the distribution is approximately 90-100% A, 80-89% B, 70-79% C, 60-69% D.

Estimated ABET Category Content:

Mathematics and Basic Science: ___ credit units or ___%

Engineering Science: 4 credit units or 100 %Engineering Design: 0 credit units or 0 %**Prepared by:** J. Michael McCarthy **Date:** July 2007**CEP Approved:** Fall 2004