BAKER COLLEGE
STUDENT LEARNING OUTCOMES

ME 4750 Kinematics
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Explore topics of kinematics and dynamics of machinery
    a. Distinguish kinetics and kinematics; analysis and synthesis
    b. Compare the differences between linkages, mechanism and machine
    c. Examine brief history and applications of kinematics
    d. Describe the design process and other approaches to design
2. Explain fundamental concepts of kinematics
    a. Describe degrees of freedom, mobility, and types of rigid body motions
    b. Examine links, joints, and kinematic chains
    c. Draw kinematic diagrams
    d. Determine degree of freedom
    e. Distinguish mechanisms and structures
    f. Define number synthesis
    g. Examine paradoxes, isomers, linkage transformation, intermittent motion, and inversions
    h. Describe Grashof condition
    i. Examine linkages of more than four bars, springs as links, compliant mechanisms, and motors and drives
3. Analyze the position, velocity, and acceleration of mechanisms
    a. Apply the complex number method for four bar, inverted crank-slider, and more than for bar linkages
    b. Examine velocity of slip, velocity of transmission, Coriolis acceleration, and jerk
4. Design cams
    a. Describe cam terminology
    b. Draw SVAJ diagrams
    c. Examine double-dwell and single-dwell designs by choosing SVAJ functions
    d. Describe critical path motion
    e. Examine cam sizing
    f. Examine practical considerations
5. Design gears and gear trains
    a. Define fundamental law of gearing
    b. Examine gear tooth nomenclature. Interference, and undercutting
    c. Define contact ratio
    d. Examine gear types
    e. Explore simple and compound gear trains, and epicyclic or planetary gear trains
    f. Define efficiency of gear trains
    g. Describe transmissions and differentials

6. Explore dynamic force analysis of linkages
    a. Construct static and kinetic freebody diagrams of links
    b. Apply newton's laws of motion for force analysis
    c. Define shaking force and shaking moment
    d. Apply static and dynamic balancing
7. Explore analytical linkage synthesis
    a. Types of kinematic synthesis
    b. Examine two-position and three-position motion generations by analytical synthesis
    c. Describe center-point and circle-point circles
    d. Examine four- and five-position analytical synthesis

These SLOs are not approved for experiential credit.

Effective: Fall 2017