

## ME 41

### Mechanisms

#### MAIN TEXTBOOK

Mechanisms and Dynamics of Machinery,  
Fourth Edition by Hamilton Mabie and Charles  
Reinholtz

#### REFERENCES

Design of Machinery, Third Edition by Robert  
L. Norton

Kinematics, Dynamics and Design of  
Machinery, Second Edition by Kenneth J.  
Waldron and Gary L. Kinzel

#### COURSE OUTLINE

- I. Introduction to mechanisms
  - a. Categories of mechanisms
  - b. Types of motion
  - c. Pairing elements
  - d. Links, Chains, and Inversion
  - e. Transmission of motion
  - f. Mobility
- II. Linkages
  - a. Transmission angle
  - b. Grashoff's Law
  - c. Position analysis of the four-bar linkage
    - i. Graphical method
    - ii. Cosine law
    - iii. Vector loop closure equations
  - d. Variants and functions of different linkages
- III. Cams
  - a. Types of cams and followers
  - b. Graphical synthesis
    - i. Disc cam with radial flat-faced follower
    - ii. Disc cam with radial roller follower
    - iii. Disc cam with oscillating flat-faced follower
    - iv. Disc cam with oscillating roller follower
  - c. Cam displacement curves
  - d. Analytical synthesis
    - i. Disc cam with radial roller follower
    - ii. Disc cam with oscillating flat-faced follower
- IV. Spur gears
  - a. Involutometry
  - b. Spur gear details
  - c. Characteristics of involute action
  - d. Interference in involute gears
  - e. Gear standardization
  - f. Minimum number of teeth to avoid interference
  - g. Determination of backlash
- V. Other types of gears
  - a. Bevel gears
  - b. Helical gears
  - c. Worm gearing
- VI. Gear trains
  - a. Calculation of train values
  - b. Analysis of planetary gear trains
    - i. Formula method
    - ii. Tabulation method
  - c. Assembly of planetary gear trains
- VII. Synthesis of mechanisms
  - a. Classification of kinematic synthesis problems
  - b. Spacing of accuracy points for function generation
  - c. Graphical design for function generation, path generators and body guidance
  - d. Cognates