

1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

ME 321 KINEMATICS OF MECHANISMS

- 2. Designation:** Required Elective
Lower Division Upper Division
- 3. Course Description:** Transmission of motion; theory of mechanisms; linkages; gears; cams; belts and chains
- 4. Prerequisites:** CE/ME 320 (Dynamics I)
- 5. Text and Materials:** Kinematics and Dynamics of Machines, Second Edition, George H. Martin, Waveland Press, 1982
- 6. Course Objectives:** This course is intended to present to students the concepts and methods as applied to the complete kinematic analysis of mechanisms. Graphical as well as analytical methods are discussed. During the course of carrying out the assignments, students are required to develop and apply computer models of the physical systems.

Course Outcomes

- the ability to analyze motions of linkages, gears, and compound mechanisms.
- the ability to perform a complete kinematic analysis of a four-bar linkage.
- the ability to analyze a planetary gear train.
- the ability to obtain computer solution by using commercial software.
- an ability to write a brief engineering report.

7. Topics Covered: (in Order of Presentation)

- Fundamental Concepts Ch. 1
- Properties of Motion Ch. 2
- Linkages Ch. 3
- Synthesis of Mechanisms Ch. 14
- The Concept of Instant Centers Ch. 4
- Velocities by Instant Centers and by Components Ch. 5
- Velocities by Method of Relative Velocities Ch. 6
- Application of Complex Numbers for Plane Kinematics Ch. 9
- Acceleration Analysis Ch. 7
- Gear Trains Ch. 13

- 8. Class Schedule:** Number of Sessions per week: 2
Duration of each session: 1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 24 units of technical electives required for the mechanical engineering program.

Engineering Science: 3 units
Engineering Design 1 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of how mechanical engineering integrates into inter-disciplinary systems

Skill outcomes:

- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

11. Prepared by: Lih-Min Hsia

05/2005