Course: ME 56200 – Advanced Dynamics

Type of Course: Required for MSE-ME concentration

Catalog Description: Kinematics of paths and particle motion; kinetics of particles, rigid bodies and multi-body systems; momentum and energy methods; linearized equations for mechanical systems; Lagrangian formulation for mechanics of mechanical systems; holonomic and non-holonomic constraints; Lagrange's equations; Hamilton's principle for holonomic systems; classification and stability of vibratory systems; applications to vehicle dynamics, orbital motion, robotics.

Credits: 3

Contact Hours: 3

Prerequisite Courses: ME 36100, Graduate standing

Corequisite Courses: None

Prerequisites by Topics: Differential Equations and Linear Algebra


Course Objectives: To provide a comprehensive understanding of the principles of dynamics of rigid bodies and multi-body systems, and to develop an ability to analyze such systems.

Course Outcomes: Students who successfully complete this course will be able to analyze kinematics and kinetics of a particle and a system of particles through understanding of (1, 7):
- Generalized coordinates
- Holonomic and nonholonomic constraints
- D'Alembert Principle
- Hamilton’s Principle
- Lagrange Equations
- Dynamic Stability

Lecture Topics:
1. Kinematics of paths and particle motion
2. Kinetics of particles, rigid bodies and multi-body systems
3. Momentum and energy methods
4. Linearized equations for mechanical systems
5. Lagrangian formulation for mechanics of mechanical systems
6. Holonomic and non-holonomic constraints
7. Hamilton's principle for holonomic systems
8. Stability of dynamic systems

Computer Usage
Low

Laboratory Experience
None

Design Experience
None

Coordinator
Bongsu Kang, Ph.D.

Date
27 March 2018