

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
Textbook	D. T. Greenwood, <i>Classical Dynamics</i> , Prentice-Hall, current edition
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) : <ul style="list-style-type: none">– Generalized coordinates– Holonomic and nonholonomic constraints– D'Alembert Principle– Hamilton's Principle– Lagrange Equations– Dynamic Stability
Lecture Topics	<ol style="list-style-type: none">1. Kinematics of paths and particle motion2. Kinetics of particles, rigid bodies and multi-body systems3. 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