

**ME 27400
BASIC MECHANICS II**

Course Outcomes [Related ME Program Outcomes in brackets]

1. Develop an understanding of static *equilibrium* and *Newton's laws of motion* and how to apply them to engineering systems. [1]
2. Develop an understanding of conservation principles (work-energy, impulse-momentum, and angular impulse-momentum). [1]
3. Introduce methods to model and evaluate the response of the 2nd order linear mechanical systems. [1]
4. Develop a systematic approach to problem solving. [1]

**Particle Dynamics
(5 wks.)**

**Rigid Bodies
In Planar Motions
(6 wks.)**

**3-D Motions
(2 wks.)**

**Kinematics
(2 wks.)**

Kinetics (3 wks.)

**Kinematics
(2.3 wks.)**

**Kinetics
(3.7 wks.)**

**Kinematics
(Moving Reference Frame)
(2 wks.)**

1. Cartesian Coordinates
2. Path Variables
3. Cylindrical Coordinates
4. Relative Motion
5. Cable-Pulley Systems

1. Newton's Laws
 - Rectilinear Motion
 - Curvilinear Motion
2. Work and Energy
3. Linear Impulse Momentum
4. Central Impact
 - Coefficient of Restitution
 - Linear Momentum
5. Angular Impulse-Momentum

1. Velocity Relations
2. Instant Centers
3. Acceleration Relations

1. Newton-Euler Equations
2. Work & Energy
3. Impulse-Momentum

1. Angular Velocity
2. Angular Acceleration
3. Velocity Relations
4. Acceleration Relations

Special Topic: Vibrations (2 wks.)

1. Drawing Free Body Diagrams
2. Deriving Equations of Motions
3. Free Response
4. Forced Response
 - Homogeneous+particular
 - Harmonic input

COURSE NUMBER: ME 27400		COURSE TITLE: Basic Mechanics II	
REQUIRED COURSE OR ELECTIVE COURSE: Required		TERMS OFFERED: Fall, Spring, and Summer	
TEXTBOOK/REQUIRED MATERIAL: Dynamics a Lecture Books by C. Krousgrill and J. Rhoads		PRE-REQUISITIES: ME 27000 – Basic Mechanics I or equivalent and ENGR 13200 – Transform Ideas to Innovation II	
COORDINATING FACULTY: Adrian Buganza Tepole		CONCURRENT PRE-REQUISITIES: MA 26200 – Linear Algebra and Differential Equations or MA 26600 – Ordinary Differential Equations	
COURSE DESCRIPTION: Review and extension of particle motion to include energy and momentum principles. Planar kinetics of rigid bodies. Kinetics for planar motion of rigid bodies including equations of motion and principles of energy and momentum. Introduction to three-dimensional kinematics of rigid bodies. Introduction to linear vibrations with emphasis on single-degree-of-freedom systems.		COURSE OUTCOMES [Related ME Program Outcomes in brackets]: <ol style="list-style-type: none"> 1. Develop an understanding of static <i>equilibrium</i> and <i>Newton's laws of motion</i> and how to apply them to engineering systems. [1] 2. Develop an understanding of conservation principles (work-energy, impulse-momentum, and angular impulse-momentum). [1] 3. Introduce methods to model and evaluate the response of the 2nd order linear mechanical systems. [1] 4. Develop a systematic approach to problem solving. [1] 	
ASSESSMENTS TOOLS: <ol style="list-style-type: none"> 1. Daily homework. 2. Periodic announced or unannounced quizzes during lecture periods. 3. Three, one-hour exams. 4. One comprehensive final exam. 		RELATED ME PROGRAM OUTCOMES: <ol style="list-style-type: none"> 1. Engineering fundamentals 2. Engineering design 3. Communication skills 4. Ethical/Prof. responsibilities 5. Teamwork skills 6. Experimental skills 7. Knowledge acquisition 	
PROFESSIONAL COMPONENT: <ol style="list-style-type: none"> 1. Engineering Topics: Engineering Science – 3 credits (100%) 			
COMPUTER USAGE: None			
COURSE STRUCTURE/SCHEDULE: Lecture - 3 days per week at 50 minutes			
PREPARED BY: Adrian Buganza Tepole (Updated by J.M. Gibert)		REVISION DATE: December 9, 2018	