ME 302: Engineering Mechanics II
Lecture: MW 4:00 – 6:00 PM GCB 207
Discussion Section: TBD

Instructor: Dr. Tyrone M. Porter
Office: ENG 319
Office Hours: MW 6-7 pm, or by appointment
Email: tmp@bu.edu

Required Textbooks:
Williams JH, *Fundamentals of Applied Dynamics*, John Wiley and Sons, Inc., 1996.
Nelson EW, Best CL, McLean WG, *Schaum's Outline of Engineering Mechanics 5th edition*, McGraw-Hill, 1997.

Supplemental Textbooks/Resources:
Hibbeler, R.C., *Engineering Mechanics: Dynamics 10th ed*, Pearson Prentice Hall, 2004.
Meriam, J.L., Kraige L.G., *Engineering Mechanics: Dynamics 6th ed.*, JW & Sons, 2007.

Course Topics:
Kinematics of particles and rigid bodies
- Inertial reference frames; coordinate systems; orbital elements & trajectories
- Intermediate noninertial reference frames

Direct/Algebraic approach to kinetic analysis (Newtonian)
- Universal law of gravitation, linear and angular momenta, moments of inertia
- Work/energy relationship

Indirect approach to kinetic analysis (Lagrangian)
- Calculus of variations, Hamilton's principle, Lagrange's equation

Grading:

Quizzes:	20% (quiz given weekly)
Projects:	20%
Exams (3):	20% per exam (October 6, November 8, Final TBD)

Assignments:
(1) Homework problems will be assigned and solutions made available on Blackboard. The homework problems and lectures will serve as the basis for quizzes to be given the week after homework is assigned.
(2) Projects will serve as a platform for students to apply principles learned in class to real-world scenarios**.** Students will be required to perform some aspect of dynamic analysis (kinematics or kinetics) and investigate design considerations for a particular device or structure.

Date	Required Reading	Topic
9/8	Schaum's Chapter 12	Particle Kinematics (review)
9/13, 15	Williams Chapter 3 Schaum's Chapter 14	Rigid Body Translation and Rotation around Fixed Axis; Time Rate of Change of Arbitrary Vector; Instantaneous Center of Zero Velocity, Rigid Body General Plane Motion
9/20, 22	Williams Chapter 3 Schaum's Chapter 14	Rigid Body General Plane Motion: Velocity and Acceleration; Use of Intermediate Reference Frames in Kinematics
9/27, 29	Williams Chapter 3	Use of Intermediate Reference Frames in Kinematics
10/4	Williams Chapter 3	Use of Intermediate Reference Frames in Kinematics; Review for Exam
10/6	Exam 1	Kinematics of Particles and Rigid Bodies
10/12, 13	Schaum's Chapter 15 Williams Chapter 6-3.1-4	Particle Kinetics: Newton's 2nd Law Moments of Inertia, Parallel Axis Theorem Rigid Body Kinetics: torque/angular acceleration
10/18, 20	Schaum's Chapter 15, 16	Rigid Body Kinetics: torque/angular acceleration Particle Kinetics: Derivation of Equations of Motion,
10/25, 27	Williams Chapter 6-3.1, Schaum's Chapter 17	Particle/Rigid Body Kinetics: Work/Energy, Change in Momenta
11/1, 3	Schaum's Chapter 17	Rigid Body Kinetics, Review
11/8	Exam 2	Kinetics: Newtonian Mechanics, Work/Energy, Momenta, Moment of Inertia
11/10	Williams Chapter 5	Introduction to Lagrangian Mechanics Variational Mechanics for Particles
11/15	Williams Chapter 5	Variational Mechanics for Particles
11/17, 22, 29	Williams Chapter 6	Variational Mechanics for Rigid Bodies
12/1	Williams Chapter 8	Derivation of Equation(s) of Motion Response of First Order Systems
12/6, 10	Williams Chapter 8	Response of Second-Order Systems Dissipation and Damping Coefficient Final Exam Review
12/15-20	Final Exam Period	