MONTGOMERY COLLEGE
Dept. of Physics and Engineering, Rockville
ENES 221 Dynamics

Course Description:

ENES 221 Dynamics 3 credits.
Kinematics of particles, force, mass and acceleration. Kinetics of particles, work and energy, impulse, and momentum. Kinematics of rigid bodies, plane motion of rigid bodies, forces and accelerations, energy and momentum methods. Kinetics of rigid bodies in three dimensions.
PREREQUISITE: ENES 102, MATH 182 and PHYS 161. *Three hours lecture each week.*

Instructor:

C. Alex Hou, PhD, PE
Department of Physics and Engineering
Office: SC 436D
Phone: 240-567-7608
e-mail: chienannalex.hou@montgomerycollege.edu

Required Text Book:

Engineering Mechanics – Dynamics, 13th Edition, by R. C. Hibbeler,
published by Prentice Hall

Main Objectives of the Course:

1. To understand the principles of kinematics and kinetics of a particle under different coordinate system.
2. To know how to draw free-body/kinetic diagrams and setup equation of motion for a rigid body.
3. To analyze and solve simple engineering problems and their applications.

Course Contents:

1. Kinematics of a Particle
   - Rectilinear Kinematics
   - Curvilinear Kinematics
   - Motion of a Projectile
2. Kinetics of a Particle: Force and Acceleration
   - Newton's Second Law and Equation of Motion
   - Rectangular Coordinates, Normal-Tangential Coordinates
3. Kinetics of a Particle: Work and Energy
   - Principle of Work and Energy
   - Conservation of Energy

4. Kinetics of a Particle: Impulse and Momentum
    Principle of Impulse and Momentum
    Linear and Angular Momentums
    Impact
5. Planar Kinematics of a Rigid Body
    Translation and Rotation
    Absolute Motion
    Relative Motion Analysis: Velocity and Acceleration
6. Planar Kinetics of a Rigid Body: Force and Acceleration
    Mass Moment of Inertia
    Equation of Motion: Translation and Rotation about am Axis
    Equation of Motion: General Plane Motion
7. Planar Kinetics of a Rigid Body: Work and Energy
    Kinetic energy and Principle of Work and Energy
8. Planar Kinetics of a Rigid Body: Impulse and Momentum
    Conservation of Momentum for a System
9. Three-Dimensional Kinematics of a Rigid Body

Grading:

Attendance, Quiz and Project	15%
Homework sets (4)	15%
Midterm Tests (3)	45%
Final Exam (1)	25%

Reference Books:

1. *Dynamics: Analysis and Design of Systems in Motion*, by Benson Tongue and S. Sheppard, John Wiley & Sons, Inc.
2. *Vector Mechanics for Engineers: Dynamics*, 10th edition, by Ferdinand Beer, E. Johnston, Jr. and P. Cornwell, McGraw Hill.

Make-Up Exam Policy:

Make-up exams are only given to the students who are officially excused. Please contact the instructor at least three days before the exam to rearrange the make-up test. If emergency occurs that students can't prearrange the make-up test, students need to talk to instructor as soon as possible and provide documents to prove the situations. In these cases, doctor's letter, government's paper and other official documents are accepted.

Support Service:

A student who may need an accommodation due to a disability should talk to me as early as possible. A letter from Disability Support Service (DSS) authorizing your accommodations will be needed.