Syllables of MEE 211: Engineering Mechanics II:

Chapter 1 Kinematics of Particles

Chapter 2 Kinetics of Particles: Newton's Second Law

Chapter 3 Kinetics of Particles: Energy and Momentum Methods

Chapter 4 Systems of Particles

Chapter 5 Kinematics of Rigid Bodies

Chapter 6 Plane Motion of Rigid Bodies: Forces and Accelerations

Chapter 7 Plane Motion of Rigid Bodies: Energy and Momentum Methods

Chapter 8 Kinetics of Rigid Bodies in Three Dimensions

Chapter 9 Mechanical Vibrations

Textbooks:

1. Ferdinand P. Beer & E. Russell Johnston Jr. Vector Mechanics for Engineers - Dynamics, 9th edition, McGraw-Hill 2010.
2. Meriam J. L. & Kraige L.G, Engineering Mechanics: Dynamics, 6th Edition, Wiley 2010.

Assessments:

- ✓ Final Exam (50%)
- ✓ First Seasonal Exam (20%)
- ✓ Second Seasonal Exam (20%)
- ✓ Quizzes (5% total).
- ✓ Homework and Class activity (5%).

Cautionary Warning:

MEE 211 is a difficult class! The course will start reviewing content you should already know from your engineering classes. It may seem easy at first. However, do not let this fool you. It will get difficult, and it will get difficult quickly. Keep up with the reading! Keep up with the homework assignments! Study the solutions!

Chapter 1 Kinematics of Particles

1.1 INTRODUCTION TO DYNAMICS

We now begin the study of dynamics, the part of mechanics that deals with the analysis of bodies in motion. Dynamics includes:

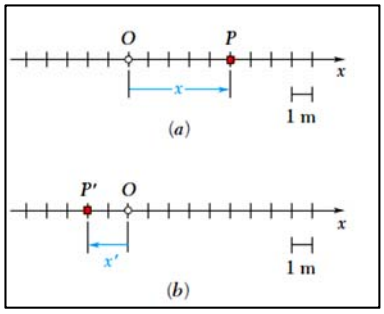
1. Kinematics, which is the study of the geometry of motion. Kinematics is used to relate displacement, velocity, acceleration, and time, without reference to the cause of the motion.

2. Kinetics, which is the study of the relation existing between the forces acting on a body, the mass of the body, and the motion of the body. Kinetics is used to predict the motion caused by given forces or to determine the forces required to produce a given motion.

RECTILINEAR MOTION OF PARTICLES

11.2 POSITION, VELOCITY, AND ACCELERATION

A particle moving along a straight line is said to be in rectilinear motion. At any given instant *t*, the particle will occupy a certain position on the straight line. To define the position P of the particle, we choose a fixed origin O on the straight line and a positive direction along the line.



Average Velocity

The *average velocity* of the particle over the time interval Δt is defined as the quotient of the displacement Δx and the time interval Δt:

$$\text{Average velocity} = \frac{\Delta x}{\Delta t}$$

Instantaneous velocity

The *instantaneous velocity* v of the particle at the instant t is obtained from the average velocity by choosing shorter and shorter time intervals Δt and displacements Δx:

$$\text{Instantaneous velocity} = v = \lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t}$$

$$v = \frac{dx}{dt}$$