COURSE OBJECTIVES

In any course, some confusion may exist as to what the instructor really feels is the important material. It is the intent of these objectives to remove this ambiguity. Mastery of these objectives should result in success in this course.

To judge if you have mastered any of the following objectives, you should be able to:

   a. Read the objective with full understanding of the terms and implications.
   b. Create your own problems which require all the operations stated in the objective for a complete solution.
   c. Solve such problems correctly.

STUDY GUIDE 1

   1. Express numerical answers to the correct number of significant figures using scientific notation. Convert units from one system to another. Express numerical and symbolic answers properly with correct units for numerical answers and correct dimensions for symbolic answers.

   2. Distinguish between scalar and vector quantities; determine the magnitudes of scalar and vector quantities.

   3. Determine graphically the sum of two or more vectors.

   4. Convert vectors from magnitude/direction form to component form, and vice versa; add and subtract vectors analytically by using their components.

   5. Define unit vector; solve for the unit vector parallel to any given vector. Use the **ijk** unit vectors to express a vector in standard **ijk** form.

   6. Define <u>position</u>, <u>displacement</u>, <u>velocity</u> and <u>acceleration</u>. Distinguish between displacement and distance, velocity and speed, average and instantaneous velocity, and average and instantaneous acceleration.

   7. Given the graph or functional form of one of the quantities $x(t)$, $v_x(t)$, or $a_x(t)$, determine the graphs of the other two.   Describe in words and equations the motion from an analysis of one or more of the graphs.

   8. Solve problems of uniform accelerated motion in one dimension.

   9. Solve problems concerning motion in a plane, including the motion of projectiles in a uniform gravitational field.

STUDY GUIDE 2

10. Solve problems concerning the displacement, velocity and acceleration of a particle moving along a circular path.

11. State Newton's first, second, and third laws. Be able to identify the reaction force to any force acting on a body. Distinguish between mass and weight.

12. Draw a diagram representing a body isolated from its environment in an inertial coordinate frame, indicate with arrows all forces that act on it, and identify the source of each force. Such a diagram is called a "free-body diagram".

13. Apply Newton's laws to determine the acceleration of an object subject to one or more forces and present a clear, concise, written solution of the problem.

14. Solve more complicated Newton's 2nd law problems, particularly those involving friction forces and/or circular motion.

STUDY GUIDE 3

15. Define work and calculate the work done by a constant force as the body on which it acts I moved by a given amount. Be able to calculate the scalar product of two vectors.

16. Define kinetic energy.

17. State the work-energy theorem. Give examples of and solve problems for which application of the work-energy theorem is appropriate.

18. Define power, and use the concept to solve problems involving the rate at which work is done.

19. Distinguish between conservative and non-conservative forces and give examples of each.

20. Calculate the work done on a particle by a uniform gravitational force and by a spring undergoing compression or extension.

21. Use the principle of mechanical energy conservation to solve appropriate problems.

22. Define the linear momentum of a particle and of a system of particles.

23. Define impulse of a force and relate it to the change in linear momentum that it causes.

24. Give examples of and solve problems for which conservation of linear momentum is appropriate. Distinguish between elastic and inelastic collisions.

STUDY GUIDE 4

25. Define torque. Solve problems involving objects in static equilibrium.

26. Define angular displacement, angular velocity and angular acceleration. Given the graph or functional form of one of the quantities versus time, determine the graphs of the other two. Describe in words and equations the motion from an analysis of one or more of the graphs.

27. Define moment of inertia, and solve problems involving rotational motion of rigid bodies subject to a net torque.

28. Calculate the angular momentum, relative to a specified axis, of a point mass traveling in a straight line.

29. Calculate the angular momentum of a rigid body whose angular velocity is specified.

30. Solve problems using the law of conservation of angular momentum.