NORMANDALE COMMUNITY COLLEGE
PHYSICS 1110 "College Physics I"
Dr. Mark Hollabaugh, Instructor Office Phone: 952-487-8461
Office: F1307 Internet: mark.hollabaugh@normandale.edu

INSTRUCTOR CONTACT INFORMATION & OUTLINE – Fall, 2006

NOTE: This information sheet is ***NOT*** the full syllabus for this course. The full, interactive syllabus for this course is located at this web site:

faculty.normandale.edu/~physics/

Textbook section numbers refer to Douglas C. Giancoli, *Physics*, 6th Edition, Prentice Hall, 2005. Note: The learning objectives and consequently the key concepts, textbook readings, and suggested problems are all subject to change.
Preface each learning outcome with the phrase, "Upon successful completion of this course, you should be able to..."

Measurement and Analysis

Learning Objectives:

1. Recognize and use the SI base units and unit prefixes.
2. Convert from one unit system to another.
3. Use dimensional analysis to check the consistency of your work.
4. Use scientific notation in your work.
5. Estimate physical parameters to check the consistency of answers.

Textbook: Chap. 1-1 through 1-8.
Problems: Chap. 1:1,3,20,23,31,34,37,39.

One Dimensional Motion (Kinematics)

Learning Objectives:

1. Define the relationship between position, velocity, and acceleration of an object in motion, both as averages over finite time intervals and as instantaneous quantities.
2. From a graph of position, velocity, or acceleration as a function of time, be able to determine the other two graphs.
3. Derive the kinematics equations for constant acceleration situations.
4. Solve one-dimensional motion problems when there is constant acceleration.
5. Define free fall and solve free fall problems.
6. Construct a graph of experimental free fall data.
7. Extract "g" from a graph of experimental free fall data.

Textbook: Chap. 2-1 through 2-5, 2-7 through 2-8.
Problems: Chap. 2:8,17,28,32,45,47,51,57,58,66,71

Vectors

Learning Objectives:

1. Resolve 2-D vectors into components.
2. Add and subtract vector components and find resultant vectors.
3. Multiply a vector by a scalar.

Textbook: Chap. 3-1 through 3-4.
Problems: Chap. 3:1,5,9,55,57

Force and Motion (Dynamics)

Learning Objectives:

1. State, explain, and give examples of Newton's first, second and third laws .
2. List the four fundamental forces of nature.

3. Use Newton's second law to translate a free-body diagram into a mathematical representation.
4. Explain what is meant by "weight".
5. Explain normal force.
6. Construct force, free-body, and force-vector diagrams
7. Recognize the difference between constant velocity and constant acceleration situations.
8. Find the net force acting on objects, their resulting accelerations and use this in problem solving.
9. Solve problems involving static and kinetic friction.

Textbook: Chap. 4-1 through 4-8.
Problems: Chap. 4:8,15,18,23,58,66,67,75,78,80

Two Dimensional Motion (Projectiles)

Learning Objectives:

1. Explain that motion in two dimensions consists of independent motions in two perpendicular directions.
2. State and use the kinematics equations for each component of motion.
3. Apply the principles of projectiles to predict projectile motion and apply the principles to other phenomena.
4. Describe qualitatively the effects of air resistance on projectile motion.

Textbook: Chap. 3-5 through 3-7.
Problems: Chap. 3: 25,28,33,71

Circular Motion & Gravitational Force

Learning Objectives:

1. Define centripetal acceleration.
2. Calculate centripetal acceleration
3. Explain what is meant by the force required for centripetal motion.
4. Solve problems where there is uniform circular motion.
5. Explain and state Kepler's three laws of planetary motion.
6. Solve problems using Newton's Universal Law of Gravitation.
7. Calculate the acceleration due to gravity, orbital velocity, and escape velocity given a planet's mass and radius.

Textbook: Chap. 5-1 through 5-3, 5-6 through 5-10
Problems: Chap 5: 2,7,10,11,13,22,30,38,46,65,70,72,73,83.

Torque

Learning Objectives:

1. Define center of mass and calculate a center of mass.
2. Recognize the similarity between angular quantities and their linear motion counterparts.
3. Define "rotational inertia".
4. Define torque and calculate the magnitude and direction of a torque.
5. Solve stable equilibrium problems in which the net torque is zero.
6. Describe how the human body generates torques.

Textbook: Chap. 7-8 and 7-9, Chap. 8-1 through 8-6, Chap. 9-1 through 9-4, (9-5 and 9-6 optional)
Problems: Chap 7: 47,53,54,55,56; Chap. 8: 7,10,11,17,23,32,38,39,76; Chap. 9: 3,19,22,24,31,32,34.71,72

Momentum: Linear and Angular

Learning Objectives:

1. State what is meant by "impulse."
2. Distinguish between external and internal forces.
3. Show that if the net external force is zero, Newton's second law results in conservation of momentum.
4. Solve problems by employing conservation of momentum and the momentum-impulse theorem.
5. Define "angular momentum."
6. State the relationship between angular momentum and torque.
7. Apply the conservation of angular momentum principle to human motion.

Textbook: Chaps. 7-1 through 7-3; 8-8.
Problems: Chap. 7: 3,11,18,21; Chap. 8: 53,54,74,80.

Work, Energy and Power

Learning Objectives:

1. Define work and energy.
2. State the units of work and energy .
3. Solve problems involving work done by forces, including gravity and elastic (spring) forces. Define kinetic energy.
4. Define and use the work-energy theorem.
5. Define power and state the units associated with power .
6. Define gravitational potential energy.
7. Define elastic potential energy.
8. Define mechanical energy.
9. Differentiate between conservative and non-conservative forces.
10. State the principle of conservation of mechanical energy and be able to apply it to solve problems.
11. Define rotational kinetic energy and calculate a rotational KE.

Textbook: Chap. 6-1 through 6-10; 8-7
Problems: Chap. 6: 2,4,10,12,15,16,22,28,29,33,43,47,49,58,65,68,72,78,83,92; Chap. 8: 44,46,48,75.

Static and Dynamic Fluids

Learning Objectives:

1. Define buoyant force.
2. Define hydrostatic pressure and derive the equation for pressure at a depth.
3. State Pascal's Principle.
4. State Archimede's Principle and solve problems using it.
5. Define surface tension and state an example.
6. Explain how the conservation of mass principle leads to the continuity equation.
7. Explain how the conservation of energy principle leads to the Bernoulli equation.
8. Solve problem using the continuity principles and Bernoulli's equation.
9. Explain viscosity.
10. Relate the principles of static and dynamic fluids to the human cardiovascular system and solve problems using these concepts.

Textbook: Chap. 10-1 through 10-14.
Problems: Chap. 10:2,4,8,17,26,30,35,36,43,58,61,63,69,79,86,87.

Thermal Physics

Learning Objectives:

1. Define temperature.
2. Distinguish between temperature and heat.
3. State the equation of state for an ideal gas.
4. Solve problems using the equation of state.
5. Define temperature based on a gas's average molecular kinetic energy.

6. Solve problems using the kinetic theory of gases .
7. Explain the concepts of vapor pressure, partial pressure and diffusion and solve problems related to these concepts.
8. Define specific heat capacity and solve problems related to calorimetry.
9. Define change of phase, latent heat, and use these concepts to solve problems.
10. Explain the three mechanism of heat transfer: Radiation, convection, and conduction.
11. Solve problems related to radiation and conduction.
12. Describe how the human body radiates thermal energy and cools the body.

Textbook: Chap. 13-1 through 13-3, 13-6 through 13-14. Chap. 14-1 through 14-8.
Problems: Chap. 13:1,3,26,29,31,39,43,45,47,50,56,60,65,67,71,72,79,99.
Chap. 14: 3,5,7,8,15,22,27,36,37,40,45,50,53,54,55,64.

***Tentative* Schedule - Fall, 2006**

21 August	First Day of Class
4 September	No Classes -- Labor Day Holiday
13 September	Quiz 1
20 September	No Classes --- Faculty Duty Day
29 September	Graded Group Problem 1
11 October	Quiz 2
19 & 20 October	No Classes
25 October	Graded Group Problem 2
8 November	Quiz 3
10 November	No Classes -- Veterans Day Holiday
22 November	Quiz 4
23 & 24 November	No Classes -- Thanksgiving Holiday
1 December	Graded Group Problem 4
6 December	Quiz 5
15 December (Friday) **08:00 AM - 10:00 AM**	Final Exam

All quiz and graded problem dates are subject to change.