**PHY 131**
**PHYSICS-MECHANICS**

## COURSE DESCRIPTION:

Prerequisites: RED 090 or satisfactory score on placement test and MAT 121
Corequisites: None

This algebra/trigonometry-based course introduces fundamental physical concepts as applied to engineering technology fields. Topics include systems of units, problem-solving methods, graphical analysis, vectors, motion, forces, Newton's laws of motion, work, energy, power, momentum, and properties of matter. Upon completion, students should be able to apply the principles studied to applications in engineering technology fields. Laboratory experiments and computer-based tutorials consolidate the basic principles of physics that are used in the engineering field. Course Hours Per Week: Class, 3. Lab, 2. Semester Hours Credit, 4.

## COURSE OBJECTIVES:

Upon completion of this course, the student will be able to:

a. Define the mechanical and fluid quantities of force, work, rate, momentum, resistance, energy and power.
b. Apply these concepts to robotics and optical fiber systems.

## OUTLINE OF INSTRUCTION:

I. Systems of units
   A. Metric and British systems
   B. Techniques of measurements
   C. Significant digits, accuracy and precision

II. Motion
   A. Displacement
   B. Vectors and scalars
   C. Graphical analysis of vectors
   D. Velocity and acceleration
   E. Equations of motion

III. Laws of motion
   A. Force
   B. Newton’s laws of motion
   C. Action and reaction
   D. Friction
   E. Gravity and weight

IV. Work and energy

A. Definition of work
B. Power
C. Potential and kinetic energy
D. Conservation of energy

V. Momentum
A. Definition of momentum
B. Elastic and inelastic collisions
C. Conservation of momentum

VI. Nonconcurrent forces
A. Parallel forces
B. Center of gravity

VII. Rotational motion
A. Torque
B. Centripetal force
C. Power in rotary systems

VIII. Properties of matter
A. Elasticity and Hooke's law
B. Density
C. Specific gravity
D. Archimedes' principle

IX. Fluids
A. Pressure
B. Hydraulic principle
C. Air pressure
D. Buoyancy
E. Fluid flow

X. Reflection
A. Reflection at plane surface
B. Concave mirrors
C. Convex mirrors
D. Ray diagrams for mirrors
E. The mirror formula

XI. Refraction
A. Refraction at plane surfaces
B. Snell's Law
C. Critical angle and total internal reflection
D. Convex lenses
E. Concave lenses
F. Ray diagrams for lenses

G. The lens equation

## REQUIRED TEXTBOOKS:

Ewen, D., Schurter, N., and P. E. Gundersen. Applied Physics. 8th ed. Upper Saddle River: Pearson Prentice Hall, 2005.

PHY 131 Laboratory modules. Durham Technical Community College, 2005.

## SUGGESTED REFERENCES, PERIODICALS, AND VISUAL AIDS:

Numerous supplementary texts, programmed materials, and audiovisual packages are available in the Educational Resources Center. These materials may be utilized to reinforce the lecture and lab material or to provide material for independent study by the student.

## STATEMENT OF STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability should request assistance from the Disability Services Coordinator within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to the Disability Services Coordinator within the first two weeks of class. The Coordinator can be contacted by calling 686-3652, (V/TT), or by visiting the Student Services Office, Room 23, of the White Building.