Douglas College

# CURRICULUM GUIDELINES

A: Division: **Instructional**

B: Department/ Program Area: **Science and Technology**

Date: **27 April 1999**

New Course [ ]

Revision [X]

If Revision, Section(s) Revised: **H, M, N**
**1999-04-27**

Date Last Revised: **27 May 1997**

| C: | D: | E: |
|---|---|---|
| **Phys 110** | **Mechanics & Heat** | **5** |
| Subject & Course No. | Descriptive Title | Semester Credits |

**F:** Calendar Description: This is a calculus-based course in mechanics and heat. Topics include vectors; particle kinematics and dynamics; momentum; work & energy; motion of systems; rotational motion; statics; oscillatory motion; wave motion; sound; temperature, thermal properties of matter, elements of thermodynamics.

**G:** Allocation of Contact Hours to Types of Instruction/Learning Settings:

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture/Laboratory

Number of Contact Hours: (per week / semester for each descriptor)
7

Number of Weeks per Semester:
14

**H:** Course Prerequisites: Physics 12 (C or higher) & BC Principles of Math 12 (C or higher)

**I.** Course Corequisites: Math 120 X
added Jan 31/2000 MD

**J.** Course for which this Course is a Prerequisite: Phys 210

**K.** Maximum Class Size: 36

**L:** PLEASE INDICATE:

[ ] Non-Credit

[ ] College Credit Non-Transfer

[X] College Credit Transfer: Requested [ ] Granted [X]

SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bccat.bc.ca)

**M:** Course Objectives/Learning Outcomes: The student will:

1) demonstrate an understanding of the basic principles and laws of mechanics and heat;
2) be able to apply the theory to the solution of problems and to the development of equations required to describe particular examples not covered formally in the classroom;
3) perform laboratory experiments and analyse the data obtained using appropriate graphing techniques, scientific notation, significant figures, and experimental uncertainty consideration;
4) be able to write formal laboratory reports and in the conventional format required of submissions to journals in physics.

N: Course Content

**1. Mechanics**

Kinematics of a Particle: one dimension
- Velocity and acceleration
- Rectilinear motion with constant acceleration

Vectors:
- Vector versus scalar
- Vector addition
- Unit vector notation
- Multiplication of vectors

Kinematics of a Particle: two dimensions
- Projectile motion
- Uniform circular motion
- Relative velocity

Dynamics of a Particle:
- Newton's laws of motion
- Friction
- Centripetal force

Work and Energy:
- Work done by constant and variable forces
- Kinetic energy
- Gravitational potential energy
- Elastic potential energy
- Conservative and non-conservative forces
- Power
- Work-energy theorem
- Conservation of energy
- Relative mass and energy

System of Particles:
- Centre of mass determination
- Centre of mass motion
- Conservation of linear momentum
- Impulse
- Collisions

Rotational Motion:
- Kinematics of pure rotation
- Torque and moment of inertia
- Dynamics of pure rotation
- Angular momentum

Statics:
- Conditions for equilibrium
- Equilibrium of a rigid body

Oscillatory Motion:
- Simple harmonic motion
- Pendulum motion

Gravitation:
- Law of gravitation

Wave motion:
- Mechanical waves
- Wave speed
- Harmonic waves
- Superposition Principle
- Interference of waves
- Standing waves
- Resonance in air columns
- Doppler effect

**2. Heat:**
- Temperature
- Thermal properties of matter
- Elements of thermodynamics

**3. Laboratory Experiments:**
- One-dimensional Motion
- Projectile Motion
- Friction/Application of Newton's Laws
- Friction Work/Conservation of Energy
- Collisions
- Rotational Motion: Kinematics and Dynamics
- Static Equilibrium
- Hooke's Law and Simple Harmonic Motion
- Standing Waves/Resonance
- Thermal Expansion of Solids
- Heat Capacity/Conservation of Energy

**O:** Methods of Instruction

Classroom time will be divided between the presentation and discussion of basic concepts on the one hand and the application of these concepts in problem solving (working through examples and problems contained in the textbook) on the other, with the majority of time devoted to the latter. The laboratory program will involve weekly three hour sessions during which students will perform a set number of experiments.

**P:** Textbooks and Materials to be Purchased by Students

Halliday, D., R. Resnick, & Walker, G. **Fundamentals of Physics**, Fifth Edition, Wiley, 1997

Douglas College, **Physics 110 Laboratory Experiments**

**Q:** Means of Assessment

The final grade assigned for the course will be based upon the following components:

1. Final examination - maximum of 30%
2. Minimum of three tests administered during the semester
   - minimum of 45% / maximum of 50%; and
3. Submitted laboratory reports
   - minimum of 20% / maximum of 25%.

**R:** Prior Learning Assessment and Recognition: specify whether course is open for PLAR

No

Course Designer(s)

Education Council/Curriculum Committee Representative

Dean/Director

Registrar