School of Arts & Science
DEPARTMENT OF PHYSICS & ASTRONOMY

Physics 104: General College Physics I.

Winter Semester 2011

COURSE OUTLINE (Section 001)

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1. Instructor Information

(a) Instructor: Dr. James Nemec
(b) Office Hours (M-Th): 12:30-2:30pm
(c) Office location: Fisher 346d
(d) Office phone: 370-3460
(e) E-mail: nemec@camosun.bc.ca

2. Course Description and Prerequisites

This course is the first of a two-part survey of Physics primarily for students in life sciences and non-science programs (the second part being Physics 105). The course explores: classical mechanics (kinematics, dynamics, circular motion and gravitation); work, energy and power; fluids; thermal energy; and nuclear energy.

Physics 104 is offered in Fall and Winter semesters. It is a 4-credit course, with 4 lecture hours and 2 lab hours per week.

The prerequisites are as follows: Physics 11 **or** PHYS 060 **or** PHYS 150 **or** departmental assessment; **and** one of MATH 073, MATH 173; or Math 11 or assessment.

3. Required Materials

(a) Course textbook: PHYSICS: Principles with Applications (5^{th} or 6^{th} edition), by D. Giancoli
(b) Physics 104/105 Lab Manual (available from the Lansdowne Campus bookstore)
(c) Pocket calculator

4. Course Content (textbook: Giancoli 6^{th} Edition)

Chapter 1. **Introduction, Measurement and Estimation**
- 1.1 The Nature of Science
- 1.2 Physics and its Relation to Other Fields
- 1.3 Models, Theories and Laws
- 1.4 Measurement and Uncertainty; Significant Figures
- 1.5 Units, Standards, and the SI System
- 1.6 Converting Units

Chapter 2. **1D Kinematics**
- 2.1 Displacement and Reference Frames
- 2.2 Average Velocity
- 2.3 Instantaneous Velocity
- 2.4 Acceleration: Average and Instantaneous
- 2.5 Kinematic Equations for Constant Acceleration

2.6 Solving Problems
2.7 Application to Falling Objects
2.8 Graphical Analysis of Linear Motion

Chapter 3. **2D Kinematics and Vectors**
3.1 Vectors and Scalars
3.2 Addition of Vectors – Graphical Methods
3.3 Subtraction of Vectors, and Multiplication of a Vector by a Scalar
3.4 Adding Vectors by Components
3.5 Projectile Motion
3.6 Solving Problems Involving Projectile Motion
3.7 Projectile Motion is Parabolic

Chapter 4. **Dynamics: Newton's Laws of Motion**
4.1 Force
4.2 Newton's First Law of Motion
4.3 Mass
4.4 Newton's Second Law of Motion
4.5 Newton's Third Law of Motion
4.6 Weight – the Force of Gravity; Normal Force
4.7 Solving Problems with Newton's Laws: Free-Body Diagrams
4.8 Problems involving Friction, Inclines

Chapter 5. **Uniform Circular Motion and Gravitation**
5.1 Kinematics of Uniform Circular Motion
5.2 Dynamics of Uniform Circular Motion
5.3 Highway Curves, Banked and Unbanked
5.6 Newton's Law of Universal Gravitation
5.7 Gravity Near the Earth's Surface; Geophysical Applications
5.8 Satellites and Weightlessness
5.9 Kepler's Laws and Newton's Synthesis
5.10 Types of Forces in Nature

Chapter 6. **Work, Energy and Power**
6.1 Work Done by a Constant Force
6.3 Kinetic Energy, and the Work-Energy Principle
6.4 Potential Energy (Gravitational, Spring)
6.5 Conservative and Nonconservative Forces
6.6 Conservation of Mechanical Energy
6.7 Problem Solving Using Conservation of Mechanical Energy
6.8 Other Forms of Energy; Energy Transformations and Law of Conservation of Energy
6.9 Energy Conservation with Dissipative Forces: Solving Problems
6.10 Power

Chapter 10. **Fluids**
10.1 Phases of Matter
10.2 Density and Specific Gravity
10.3 Pressure in Fluids
10.4 Atmospheric Pressure and Gauge Pressure
10.5 Pascal's Principle
10.6 Measurement of Pressure; Gauges and the Barometer
10.7 Buoyancy and Archimedes' Principle
10.8 Fluids in Motion; Flow Rate and Equation of Continuity
10.9 Bernoulli's Equation
10.10 Torricelli's Theorem

Chapters 13. **Temperature and Kinetic Theory**

13.1 Atomic Theory of Matter
13.2 Temperature and Thermometers
13.3 Thermal Equilibrium
13.4 Thermal Expansion
13.6 Gas Laws and Absolute Temperature
13.7 Ideal Gas Law
13.8 Problem Solving With the Ideal Gas Law
13.9 Ideal Gas Law in Terms of Molecules: Avogadro's Number
13.10 Kinetic Theory and the Molecular Interpretation of Temperature

Chapter 14. **Heat**

14.1 Heat as Energy Transfer
14.2 Internal Energy
14.3 Specific Heat
14.4 Calorimetry – Solving Problems
14.5 Latent Heat
14.6 Heat Transfer: Conduction
14.7 Heat Transfer: Convection
14.8 Heat Transfer: Radiation

Chapter 30. **Nuclear Physics and Radioactivity**

30.1 Structure and Properties of the Nucleus
30.2 Binding Energy and Nuclear Forces
30.3 Radioactivity
30.4 Alpha Decay
30.5 Beta Decay
30.6 Gamma Decay
30.7 Conservation of Nucleon Number and other Conservation Laws
30.8 Half-Life and Rate of Decay

Chapter 31. **Nuclear Energy**

31.1 Nuclear Reactions and the Transmutation of Elements
31.2 Nuclear Fission; Nuclear Reactors
31.3 Nuclear Fusion; Application (energy production in stars)

5. Department Policies Regarding Testing and Labs

(a) Students are expected to write tests and the final exam at the scheduled time and place. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test or provide a make-up test only in the event of documented illness or other extenuating circumstances.
(b) All assigned laboratory exercises must be completed with an overall grade of 60% or better to obtain credit for this course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances.
(c) A student who is repeating Physics 104 does not have to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

6. Study time and Basis of Student Assessment

It is recommended that between five and 10 hours per week (or more for students with a weak background) be spent studying for this course outside of class time.

(a) Lab Performance and Reports – in order to obtain a passing grade for this course, students must satisfactorily complete the lab component of the course. **[15%]**

(b) Two Midterm Exams – these will be given after covering Chapters 1-3 (towards the end of September), and after covering Chapters 4-6 (early November). **[2 x 17.5% = 35%]**

(c) Final Exam – a comprehensive Final Examination (December 2010) **[50%]**

7. Grading System

The following percentage conversion to letter grade will be used:

A+ = 90 - 100%	B = 73 - 76%	D = 50 - 59%
A = 85 - 89%	B- = 70 - 72%	F = 0 - 49%
A- = 80 - 84%	C+ = 65 - 69%	
B+ = 77 - 79%	C = 60 - 64%	

8. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at http://www.camosun.bc.ca

ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html