BRANDON UNIVERSITY

**74:090 ELEMENTARY CONCEPTS IN PHYSICS**

# COURSE OUTLINE 2016-2017

**Instructor:** Mrs. Kathleen Nichol

 Room 2-11 Brodie Bldg.

 Telephone: 727-9691 (Office), 725-0952 (Home)

 Email: nichol@BrandonU.ca

**Time & Place** **Lectures:** Slot 10 (Tuesdays and Thursdays, 8:30 am – 9:50 am)

Room 4-34 Brodie Bldg.

 **Lab Periods:** Mondays afternoons

1:40 p.m.- 4:30 p.m.

 Room 2-32 Brodie Bldg.

**Textbook:** 1. Inquiry into Physics, by Ostdiek and Bord $103.00 new or $82.50 used.

 ***or***

Physics, 6*th* Edition*,* by Giancoli (used in previous years)

 2. Lab Manual (available in lab) $ 16.00

**Credit:** 3 credit hours

**Course Length:** Two Terms

**Marking scheme:** Unit tests 20%

 Laboratories 15%

 Midterm Test 15%

 Assignments 5%

 Project 5%

 Final exam 40%

 100%

**Nature of the course:** Physics is the study of motion. Physicists use concepts of velocity and acceleration to measure motion, and concepts such as force, energy, momentum, torque, relativity and quantum physics to explain why motion occurs or changes. They study the motion of a wide range of stuffs – from tiny electrons in atoms and electrical impulses in the human brain, to the grand motions of the planets and stars. The topics we will study involve these concepts applied to a variety of situations, including free falling bodies, projectiles, planetary gravitation, sound waves, the phenomenon of light, current and static electricity, heat as a form of energy, fluid properties like buoyancy, and nuclear physics.

The course is designed to give students the equivalent of grades 11 and 12 high school physics. It may be used as the prerequisite to enter General Physics, 74:151/152 or Foundations of Physics, 74:161/162. Students with a grade of 70% or better in 30S Physics may be permitted to enter the course in January (see the Instructor).

**Course Delivery:** Classes will involve lectures and some work time.

**Tests:** On each topic, students will be asked to complete and hand in an assigned worksheet and to write a test. The tentative test dates are given on page 3.

**Test Rewrite options:** The pass mark on the unit tests is 65%. It is anticipated that you will pass each test, but will be given the option of writing a second test *on two tests of your choice per term,* if needed to improve your mark. The rewrites are different tests but cover the same topics.

**Labs:** For the laboratory periods, experiments have been scheduled that match the ideas being studied in the class. The purposes of the labs will be: to learn to use equipment that physicists use such as vernier calipers, air tables, Geiger counters, and oscilloscopes; to test predictions by taking careful and precise measurements using the equipment available; to measure properties of materials such as density or specific heat; to observe applications of physics concepts; and to interpret observations.

 The lab mark will be the average of all the labs, except two. Thus, up to two labs may be missed during the year.

 Late labs are docked two marks. If more than one week late, the mark is zero.

The laboratory schedule has been given on page 4.

**Project:** The project will involve independent reading or experimenting, then writing of a brief report, and making a short presentation in class.

**Review periods:** are scheduled at certain times during the year. In the review period, you will be given time to work on a sheet of problems. Handing in the completed sheet will give you the option of discarding a low test mark, once per term.

**Moodle Site:** <http://wolf.brandonu.ca/moodle/> The course password is “accelerationtoxrays”.

**Grading System:**

**90% - 100% A+**

**85% - 89.9% A**

**80% - 84.9% A-**

**76% - 79.9% B+**

**70% - 75.9% B**

**65% - 69.9% C+**

**60% - 64.9% C**

**50% - 59.9% D**

**Less than 50% F**

**Learning Goals:**

\* read/see/hear/investigate/work through/discuss concepts so you understand them

\* pick information out of a problem, label it, choose a concept or formula(s) that applies, solve the problem

\* check the solution by estimation or reasonableness or by plugging into equations

\* match a term to its definition

\* explain a concept or application briefly

\* list the main ideas covered in the course

\* investigate a topic of interest to you, write a written report and present in class

\* follow instructions to use equipment and carry out experiments

\* troubleshoot problems in the lab setting

\* work effectively with partners in the lab setting

\* compare experimental results to expectations

\* recognize and develop your own learning style

\* enjoy the study of physics

\* succeed in the above tasks

**Elementary Concepts in Physics Schedule**

# **Exercise Topic Ostiek/Bord Giancoli Tentative Test Date**

#  **Chapter Chapter**

 **1** Mathematical Preface Notes in Manual Chapter 1,

 (powers, equations, geometry, + Text p11-13 + Notes in Manual September 20
 graphs, trigonometry, vectors) + Chapter 3.

 **2** Measurement Prologue p xv-xvi Chapter 1

 Chapter 1.1 p 2-7 October 11

 **3** Motion: Speed, Velocity, Chapter 1.2-1.4 Chapter 2

 Acceleration, Free Fall

 **4** Forces – Statics Chapter 2.1-2.7 Chapters 3 (vectors) and 4

 Forces − Newton’s Laws Chapter 4 November 1

 **5** Projectile Motion Notes in Manual Chapter 3 (pages 54-62)

 **6** Circular Motion Chapter 1.3 & 2.8 Chapter 5 November 22

 and Gravitation & Notes in Manual

 **7** Work and Energy Chapter 3.1, 3.3 Chapter 6

 3.4, 3.5, 3.7 December 6

  **December Progress Exam, Saturday, December 10, 2:00 p.m. – 5:00 p.m.**

 **8** Momentum Chapter 3.1, 3.2, Chapter 7

 3.6, 3.8

 **9** Torque, Centre of Mass, Notes in Manual Chapter 8 (pages 203-205) January 17

 and Levers and notes in manual

**10** Waves & Sound Chapter 6 Chapter 11 & 12

 **11** Light Chapters 8.5 & 9 Chapters 22-24 February 7

 **12** Current Electricity & Chapter 7 Chapters 18, 19

 Magnetism Chapter 8.1-8.3 Chapters 16, 20 March 14

 **13** Temperature,

 Thermal Energy, KMT Chapter 5 & 8.7 Chapters 13 and 14

 **14** Density and Fluids Chapter 4 Chapter 10

 **15** Atomic Theory of Matter Chapter 10 Chapters 27 and 28 (if time) April 4

 **16** Nuclear Physics Chapter 11 Chapters 30 and 31

#  **Final Exam, Saturday, April 15, 2:00 p.m. - 5:00 p.m.**

**TENTATIVE LABORATORY SCHEDULE**

**Date Lab Laboratory Title**

September 12 Lab 1 Measurement

 19 Lab 2 Pendulum

 26 Lab 3 Measurement of Speed

October 3 Lab 4 Free Fall *.*

 10 Thanksgiving

 17 Lab 5 Forces

 24 Lab 6 Newton’s Second Law

 31 Review

November 7 Lab 7 Friction and the Inclined Plane *and*

 Lab 8 Projectiles

 14 Lab 9 Circular Motion

 21 Review and view videos on space travel

 28 Lab 10 Conservation of Energy on an Air Track

December 5 Review

January 9 Lab 11 Conservation of Momentum *and*

 Lab 12 Torque and Centre of Gravity

 16 Review

 23 Lab 14 Light: Properties of Reflection & Refraction

 30 Lab 15 Diffraction of Light: Identifying an unknown gas from its
 Line Spectrum

February 6 Review

 13 Lab 16 Current Electricity

 20 - - - - - Midterm Break

 27 Lab 17 More on Electricity & Magnetism

March 6 Lab 18 Specific Heat

13 Review

 20 Lab 19 Archimedes’ Principle

 27 Lab 20 Half-Life of a Radioactive Substance

April 3 Review

**Project Timeline:** Project introduction November 28

 Project topic due December 6

 Project references due January 5

 Project due January 23

 Project Presentations February 9 and 14