



## I. COURSE DESCRIPTION:

The intention of this course is to provide both a review of, and a more in-depth study of many of the concepts of applied physics introduced in secondary school physics curricula. An attempt will be made to limit the topics to those which should prove to be relevant to the aviation flight student.

## II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

- A) Write definitions for the concepts introduced in his/her own words.
- B) Answer questions demonstrating knowledge and understanding of the concepts presented.
- C) Answer questions requiring extrapolation of the course content.
- D) Solve problems requiring an understanding of the course theory.

### 1. Introduction and Mathematical Concepts

Potential Elements of the Performance:

- a) mathematics of basic physics
- b) units of measurement
- c) 'base' quantities and 'base' units
- d) S.I. metric prefixes and their abbreviations
- e) 'derived' quantities and 'derived' units
- f) conversion of units of measure
- g) significant figures
- h) numerical 'accuracy' and 'precision'
- i) 'vector' and 'scalar' quantities

### 2. KINEMATICS and DYNAMICS

Potential Elements of the Performance:

- a) 'distance' and 'displacement'
- b) 'speed' and 'velocity'
- c) acceleration
- d) equations for 'uniformly accelerated motion'

- e) the ‘acceleration due to gravity’ – “free fall”
- f) projectile motion
- g) forces
- h) Newton’s first law of motion – the ‘law of inertia’
- i) Newton’s second law of motion
- j) Newton’s third law of motion
- k) types of forces
- l) the force of gravity
- m) the distinction between ‘mass’ and ‘weight’
- n) the ‘normal force’ and Newton’s Third Law of Motion
- o) static and kinetic frictional forces
- p) the tension force
- q) static equilibrium problems
- r) applications of Newton’s laws of motion

3. WORK, ENERGY, IMPULSE and MOMENTUM  
and ROTATIONAL KINEMATICS

Potential Elements of the Performance:

- a) work and energy
- b) kinetic energy
- c) gravitational potential energy
- d) conservation of mechanical energy
- e) power
- f) the conservation of energy
- g) efficiency
- h) mechanical advantage (actual)
- i) velocity ratio (ideal mechanical advantage)
- j) analyze and describe simple machines
- k) momentum
- l) impulse
- m) conservation of momentum
- n) angular measurement
- o) angular velocity
- p) angular acceleration
- q) equations of rotational kinematics
- r) relationship between *angular motion* and *linear motion*
- s) normal acceleration or centripetal acceleration
- t) centripetal and centrifugal forces

4. MECHANICAL PROPERTIES OF SOLIDS, LIQUIDS & GASES

Potential Elements of the Performance:

- a) mass density
- b) weight density
- c) specific gravity
- d) pressure
- e) units of pressure measurement
- f) pressure at a depth in a liquid
- g) atmospheric, absolute and gauge pressure
- h) Pascal's law
- i) the hydraulic press
- j) Archimedes' principle
- k) fluids in motion
- l) Bernoulli's Principle and Equation

## 5. TEMPERATURE AND HEAT

Potential Elements of the Performance:

- a) temperature
- b) temperature scales
- c) absolute temperature scales
- d) heat
- e) thermal linear expansion of solids
- f) thermal area expansion of solids
- g) thermal volume expansion of solids
- h) thermal volume expansion of liquids
- i) units of heat measurement
- j) specific heat capacity
- k) changes of state
- l) specific latent heat of fusion
- m) specific latent heat of vapourization
- n) methods of heat transfer
- o) Boyle's gas law
- p) Charles' gas law
- q) Gay-Lussac's gas law
- r) the general gas law
- s) the ideal gas law

## 6. WAVE MOTION AND SOUND

Potential Elements of the Performance:

- a) types of waves
- b) periodic motion
- c) the nature of sound
- d) the frequencies of a sound wave

- e) speed of sound
- f) loudness and intensity of sound

<b>III. TOPICS:</b>	<b>Approximate Timeframes</b>
1. INTRODUCTION and MATHEMATICAL CONCEPTS	8 hours
2. KINEMATICS and DYNAMICS	14 hours
3. WORK, ENERGY, IMPULSE and MOMENTUM and ROTATIONAL KINEMATICS	14 hours
4. MECHANICAL PROPERTIES of SOLIDS, LIQUIDS and GASES	14 hours
5. TEMPERATURE and HEAT	14 hours
6. WAVE MOTION and SOUND	

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

**1) TEXTBOOK:**

**Title:** PHYSICS, 4th edition  
**Author(s):** James S. Walker  
**Publisher:** Addison Wesley  
**ISBN- 10:** 0-321-61111-6  
**ISBN- 13:** 978-0-321-61111-6

**2) Scientific Calculator**

## V. EVALUATION PROCESS/GRADING SYSTEM:

Your final grade in PHY 125-4 will be determined on the basis of four tests to be administered during the semester. Each test will examine your knowledge of a number of topics and will be administered within one week of completing those topics. The topics covered in each of the four tests are as follows:

Test #1 ----- Topic Number I and Topic Number II (Part i)

Test #2 -----Topic Number II (Part ii)  
Topic Number III

Test #3 ----- Topic Number IV

Test #4 ----- Topic Number V

The four tests are of equal weight. (i.e. **Each of the four tests is worth 25% of your final grade.**) As a result, **provided you have received a passing grade in each of the four tests, your final grade will simply be an average of your four test results.** In order to obtain your letter grade the percentage-letter grade equivalents shown on page 30 will be used.

If your final average is below 50%, **or** if you have received a failing grade in one or more of the unit tests, whether you receive an 'X' grade (*Incomplete*) or an 'F' grade (*Fail*) is entirely at the professor's discretion. The decision will be based upon *your final average* (e.g. 32% **would** result in an F grade while 48% **might** result in an X grade.); *your attendance* during the semester; *your attitude* while in the classroom; *your perceived level of effort* during the semester; etc..

In any case, should you find yourself with an X grade at the end of the semester, in order to upgrade your mark to a passing grade you will be required to write a "make-up" **examination covering the entire course content.** *Should you receive a passing grade on the make-up examination (50% or higher) your X grade will be upgraded.* The best you can do after receiving an X grade as a result of a failing average is a 'C' grade! If you were required to write the supplemental examination as a result of having failed or missed one test you may substitute the exam result for this test result.

Prior to administering any test you will be notified a full week in advance. Should you, for any reason (*within reason of course*), not be able to be in attendance on a day for which a test has been scheduled it is **your responsibility** to notify the teacher **prior** to the test! **If your reasons are acceptable** a date will be set during which you may write a substitute test for the one you have missed.

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	
A	80 – 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

### **Attitude and Conduct specific to the Aviation – Flight Program**

Attitude plays an important role in your ability to exercise good judgement. Although attitude is not being graded (except with regard to making a call between granting an 'X' grade over an 'F' grade), it affects your ability to learn as well as your safety as a student and future as a professional pilot. Students who display a strong tendency toward any of the five hazardous attitudes pose a grave risk to themselves and others. For this reason these students will be counseled and put on behavioural contract. If counseling is ineffective, then the student will be withdrawn from the program.

*The five hazardous attitudes are identified as Anti-authority, Impulsivity, Invulnerability, Machismo and Resignation. These hazardous attitudes are described in "Human Factors for Aviation – Basic Handbook" on pages 151 and 152.*

**NOTE:** The above two paragraphs were taken from the course outline for *Flight Operations AVT 377-2*. Although more pertinent to an *aviation* course as such than a course in *physics*, since the students taking this course are doing so as part of their Aviation – Flight program there is a certain amount of relevance to this course as well.

### Mid Term Grades for Aviation – Flight students

As the aviation – flight student is required to maintain a 'B' average to remain in the program, mid term grades will reflect this requirement by assigning an 'S' (satisfactory) grade only to those students who are maintaining at least a 70% current grade in the course. A 'U' grade (unsatisfactory) will be assigned to students who, at mid term, are carrying a grade of 69% or less. This does not necessarily mean that the student is failing the course at mid term however. Should the student be carrying a 'D' or a 'C' grade at mid term, which of course is a passing grade, he/she will still be given a 'U' reflecting the specific requirements of the aviation – flight program.

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade “C”, (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations. Announcements, news, the academic calendar of events, class cancellations, your learning management system (LMS), and much more are also accessible through the student portal. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session. *<Optional: It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.>*

Tuition Default:

Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not honoured) as of the first week of *<choose November, March, or June>* will be removed from placement and clinical activities. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default. Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.

*<include any other special notes appropriate to your course>*