

# UNIVERSITY OF GUELPH DEPARTMENT OF PHYSICS

## PHYS\*1080 W'08 Physics for Life Sciences

**IMPORTANT:** Please retain this material and consult it regularly during the semester. This information will be important to you as the course progresses.

**LECTURERS:** Sections 01 & 02 **ErnieMcFarland MacN435D** Ext.53653 email: [elm@physics.uoguelph.ca](mailto:elm@physics.uoguelph.ca)  
Section 03 **Martin Williams MacN 212** Ext. 58546 email: [martin@physics.uoguelph.ca](mailto:martin@physics.uoguelph.ca)

**QUIZ ROOM ADMINISTRATOR:** Cindy Wells SCIE1101A Ext. 52445 email: [cindy@physics.uoguelph.ca](mailto:cindy@physics.uoguelph.ca)  
(Please email the Quiz Room Administrator with course related inquiries and to report any errors in your Blackboard record.)

**PREREQUISITES:** (1 of 4U Physics, OAC Physics, PHYS\*1020), one 4U or OAC Mathematics course

**RESTRICTIONS:** PHYS\*1000

Students in this course will need to use Blackboard to write required pretests, perform a simulated experiment on diffusion for Study Guide 17, and check their term marks. **As soon as possible, you should check that you can login to Blackboard:**

- \* Use a web browser to go to: <http://courselink.uoguelph.ca/>,
- \* Follow the Blackboard login instructions.

### **FINAL EXAMINATION CONFLICTS**

The University's policy regarding examination conflicts, as stated in the Undergraduate Calendar, is as follows: "Students who drop and add courses are required to consult the examination timetable in order to avoid conflicts in examination times. Written approval must be obtained from the dean or director and the instructor-in-charge of the course to register in courses that have conflicting examination times."

### **TEXT AND OTHER REQUIRED MATERIALS:**

- (i) **Text:** *Physics for the Biological Sciences: A Topical Approach to Biophysical Concepts* (4<sup>th</sup> Edition); F.R. Hallett *et al.* Available in the University Bookstore and the Co-op Bookstore.

Item (ii) below is available in the Quiz Room (SCIE1101A) (**CASH ONLY, please**). For the sale of this item, the Quiz Room will be open on Jan. 7, 8 & 9 9am-12noon/1-4pm. After Jan. 9<sup>th</sup> this item may be purchased in the Quiz Room during normal Quiz Room hours which are 9-11am and 1-3pm Monday-Friday.

- (ii) **Study Guide/Laboratory Manual for PHYS\*1080 (July 2007 printing): \$15.00 (CASH ONLY)**  
Note that the last page of the Study Guide section is a copy of the formula sheet that is used in the Quiz Room and supplied as part of the final examination.

- (iii) In addition to the pretests and the experiment for Study Guide 17, the following items are available via Blackboard:
- (a) **Solutions to Self-Tests** in the Study Guides
  - (b) Three **Sample Final Examinations**
  - (c) **Textbook Problem Solutions** for all the mechanics problems (Chapters 7-10) and for selected problems in the remaining chapters.
  - (d) **Computer Tutorials** on various topics (list on pg. 8)
  - (e) **Errata** for the textbook and for the Study Guide/Lab Manual.
  - (f) **One sample quiz** for each Study Guide.
- (iv) **Calculator** (with trig functions, logs, etc.) – **(graphing calculators are not allowed in the quiz room or exam)**
- (v) **This Course Outline:** includes important dates and deadlines, lecture schedule, evaluation information, personal record sheet, etc.

**DROP AND ADD FORMS:** Instructor's signature to drop or add this course is not required.

**LOST AND FOUND:** "Lost and Found" is in the **Quiz Room (SCIE1101A)**.

**LECTURE PERIODS:**

Section 01:	Tues., Thurs.	10:00-11:20am	MacN 105
Section 02:	Tues., Thurs.	1:00-2:20pm	MacN 105
Section 03:	Wed.	7:00-9:50pm	MacN105

**FINAL EXAM:** **MONDAY, APRIL 7<sup>TH</sup>, 2008 11:30am-1:30pm**

## **PHYS\*1080 W'08**

### **DEADLINES AND IMPORTANT NOTES**

**STUDENTS MUST SHOW THEIR U OF G PHOTO ID CARD IN ORDER TO WRITE A QUIZ**

**NOTE: ONLY 1 QUIZ ATTEMPT PER TIME SLOT ALLOWED ON SAME QUIZ MATERIAL.**

Wk. 1 **Mon. Jan. 7** Quiz Room (SCIE1101A) and Lab Room (MacN 304A) open.

Wk. 4 **Fri. Feb. 1** Last day to write **Quiz #6**

Wk. 6 **Fri. Feb. 15** Last day to write **Quiz #7**

Wk. 8 **Fri. Mar. 7** Last day to write **Quiz #8**

Wk. 10 **Thur. Mar. 20** Last day to write **Quiz #9**

Wk. 12 **Fri. Apr. 4** Last day to write **Quiz #10**

Wk. 12 **Fri. Apr. 4** **QUIZROOM CLOSSES FRIDAY, APRIL 4<sup>th</sup> AT 3:00pm**

- **Be careful not to run out of quiz room time slots when writing quizzes. Your 1<sup>st</sup> attempt should be well in advance of the deadline point to allow for a possible 2<sup>nd</sup> or 3<sup>rd</sup> attempt.**

**PRETESTS MUST BE PASSED WITH A MINIMUM OF 60% PRIOR TO MAKING YOUR 1<sup>ST</sup> QUIZ ATTEMPT. ALLOW AT LEAST 1 HR. FOR YOUR PRETEST MARK TO BE PROCESSED.**

**YOU ARE ADVISED TO SIGN UP FOR AND COMPLETE YOUR REQUIRED LABS EARLY IN THE SEMESTER TO ENSURE ALL REQUIRED LABS ARE COMPLETED BY QUIZ DEADLINES. ALSO, LABS MUST BE SIGNED/STAMPED BY T/A IN LAB ROOM NO LATER THAN THE DAY PRIOR TO ATTEMPTING THE RELATED QUIZ.**

**QUIZ ROOM HOURS (SCIE1101A):** times given are when the door opens and closes.

**Monday – Friday** 9:00 – 11:00am 1:00 – 3:00pm

**LAB ROOM HOURS (MacN 304A):** Extra opening times may be added depending on enrolment.

**Monday** 12:00noon – 4:00pm

**Tuesday, Wednesday, Thursday** 10:00am – 3:00pm

**Friday** 10:00am – 1:00pm

**PHYS\*1080****Tentative Lecture Schedule – Winter 2008 (Sec. 01 & 02)**

**Section 03, the Wednesday evening lecture will cover all the topics from that week's Tuesday and Thursday lectures in Sections 01 & 02**

LECTURE		DATE		LECTURE TOPIC	STUDY GUIDE NUMBER
L1	Tue	<b>JAN</b>	8	Kinematics	9
L2	Thu		10	Kinematics	9
L3	Tue		15	Kinematics, Forces & Torques	9,10,11
L4	Thu		17	Forces	10
L5	Tue		22	Momentum, Work & Energy	10
L6	Thu		24	Energy, Rotational Motion	10,11
L7	Tue		29	Rotational Motion	11
L8	Thu		31	Rotational Motion	11
L9	Tue	<b>FEB</b>	5	Rotational Motion	11
L10	Thu		7	Elasticity	12
L11	Tue		12	Scaling	12
L12	Thu		14	Pressure, Barometric Eq'n.	13
	<b>Mon - Fri</b>		<b>18-22</b>	<b>WINTER BREAK – no classes</b>	
L13	Tue		26	Surface Tension	13
L14	Thu		28	Non-Viscous Fluid Flow	14
L15	Tue	<b>MAR</b>	4	Viscous Fluid Flow	14
L16	Thu		6	Pulsatile Flow, Bolus Flow, Turbulence	15
L17	Tue		11	Turbulence, Aneurysms	15
L18	Thu		13	Perrin's Experiment	16
L19	Tue		18	Sedimentation, Diffusion	16,17
L20	Thu		20	Diffusion	17
L21	Tue		25	Osmotic Pressure	17
L22	Thu		27	Heat	18
L23	Tue	<b>APR</b>	1	Heat	18
L24	Thu		3	Review, Info re Final Exam	

## HOW THE COURSE WORKS

### INTRODUCTION

Students' study schedules at University are often based on a crisis-to-crisis approach (When's my next midterm exam?) rather than on organized learning. To reduce this problem, Physics For Life Sciences is offered using a "Personalized Instruction" method which gives the student some flexibility in scheduling study time.

The central idea of this teaching method is the accommodation of both the student who needs or likes formal lecture teaching and the student who prefers guided self-instruction. Indeed, in this course, any combination of these two extremes may be mixed to the student's own taste.

Many tens of thousands of students have taken this course and almost every semester has seen some modification, usually minor, in the operation of the course. The present version of the study materials incorporates a large number of constructive suggestions made by students. We hope you will continue to point out errors, omissions and weaknesses so that the course and its teaching materials can be regularly upgraded. We are confident that this thoroughly tested learning concept will continue to be met with enthusiastic approval from the majority of our students.

### LECTURES

Formal lectures will be given and you will find a detailed timetable of dates and topics in this course handout. Students may attend all of the lectures or select only those topics in which they feel they need lecture support. You are strongly advised to attend lectures until you are sure that the self-study method works for you. In any case, the entire course content will be covered in these lectures. Whether you attend lectures or not, it is your responsibility to check the door to the quiz room for important weekly notices regarding the course.

### MODULES

The Study Guide (SG) contains the ten modules (SG 9 to 18) for this course, which are summarized on pg. 6 of this outline. These ten modules cover the entire course and are designed so that you need never actually attend a lecture if you follow their advice scrupulously. (You must, however, do laboratory work.) Each module provides you with:

- 1) a brief introductory discussion of what the module is about,
- 2) the educational objectives of the module,
- 3) a detailed study guide (reading and problem lists, etc.)
- 4) self tests,
- 5) answers to self tests, and sometimes
- 6) extra problems.

These self-study modules are your chief help; the Study Guide is a teacher at your side constantly and should be studied with care.

## Phys\*1080

### Course and Quiz Organization and Preferred Path

Graphing Review (ref. pg 7 of this outline)

#### Quiz #6 requirements

- Kinematics SG. 9
- Newton's Laws, Momentum & Energy SG. 10
- Experiment 10
- **Pretest 6**

#### Quiz #7 requirements

- Rotational Motion SG. 11
- Knowledge of Experiment 10
- **Pretest 7**

#### Quiz #8 requirements

- Elasticity & Scaling SG. 12
- Experiment 12
- Pressure & Surface Tension SG. 13
- Experiment 13
- **Pretest 8**

#### Quiz #9 requirements

- Fluids in Motion SG. 14
- Experiment 14
- Turbulent Flow SG. 15
- **Pretest 9**

#### Quiz #10 requirements

- Boltzmann Eq'n & Sedimentation SG. 16
- Diffusion, Osmotic Pressure SG. 17
- **Pretest 10 & Experiment 17 (computer lab)**

Heat SG. 18 will be tested on the final examination (at least 2 questions)

### DIAGNOSTIC QUIZZES

**Note that quizzes are withdrawn on specific dates (see pg. 2), so these should be attempted as appropriate. Also, note that some quizzes may require knowledge of material from previous quizzes. A non-credit PRETEST must be passed before its Quiz for credit can be written. The PRETESTS are available on Blackboard. See page 9 for details. There is a PRETEST available for S.G. 18 even though there is no Quiz. This is strongly recommended for study purposes for the final exam.**

Regardless of the combination of formal lectures and/or self-study you use to acquire knowledge in the course, the question is "how do you demonstrate this knowledge and receive credit for it?" When you think you have mastered the contents of the required modules, and have passed (60%) the associated PRETEST, you should go to the Quiz Room where you may request a Diagnostic Quiz. This quiz is designed to test your mastery of the material. Note however a very important point. There are far more study guide topics than there are quizzes that you are expected to write. Consequently, 4 of 5 of the quizzes include questions from two study guides as shown at the top of this page. For example, quiz #6 contains questions from study guides 9 & 10 (and Experiment 10).

It is therefore very **important that you come to the quiz room prepared for the relevant study guides** and have passed the pre test. ***You will need your University of Guelph photo ID card in order to write a quiz.*** This quiz is designed to test your mastery of the material. The time allotted for each quiz is **20 minutes**. When you have completed the quiz, it is marked immediately by a tutor in your presence<sup>1</sup>. In this way, no time is wasted teaching you things you already know, but the quiz will isolate those things (if any) you don't know. The tutor will give you help on the spot. It is important to emphasize the diagnostic aspect of this quiz; diagnosis is its prime purpose. It is of no value to write one if you are not prepared; you are wasting everyone's time. The level at which you are considered to have "mastered" the material is 80%, i.e., the "pass mark" is 8.0 out of 10.0. Please see "Evaluation of Quiz Marks" section on pg. 8.

Each module that is passed contributes 10% toward your course mark. If you do not get 8 out of 10 on your first attempt (and you may not), it doesn't matter. There is no stigma attached to failing this quiz; that is not its purpose. You may go away, study, and try again. The quiz will have served to show you what you must study. Obviously there must be a limit to the number of times you may write quizzes on a particular pair of study guides (or the single study guide 11), and this has been set at three. **Also, you may not attempt more than one quiz on any given pair of study guides in a single quiz period.**

During quizzes (and the final examination), you may use a pocket calculator (**graphing calculators are not allowed**). In the quiz room, each desk is provided with a sheet of formulae. A copy of this sheet will be included in the final exam, and is also included on the last page in the Study Guide and Lab Manual. **No material in the form of quizzes or paper may be taken from the Quiz Room and all paper used when writing a quiz must be turned in.** You should visit the quiz room during the first week of the semester to see how the system operates.

As shown on pg. 6, there are 5 quizzes to be completed. There is no quiz on SG 18, although there will be at least 2 questions on SG 18 on the final examination. A sample quiz for each Study Guide is available on Blackboard.

Self-paced study is a new experience for most students. At best, it permits you to work ahead in physics early in the semester, freeing study time for other courses during heavy weeks. At worst, there is a temptation to leave things too late. To help pace students, deadlines are placed on quizzes. (Refer to pg.2.)

## **GRAPHING REVIEW**

Some quizzes will require you to sketch graphs of simple functions, or to plot graphs of data. To prepare for this graphing, you should work through the computer tutorial - Graphing Simple Functions (available via Blackboard) and also read the "Graphing Hints" at the beginning of the lab experiments section in the Study Guide and Lab Manual.

## **EXPERIMENTS**

There are 5 experiments to be done, associated with S.G. units 10, 12, 13, 14 and 17 (see pg. 6). Four of these experiments are done in the lab room (MacN 304A) and they may be performed in any order, at any time the lab is open (see page 3 for hours of operation). The laboratory operates as an open lab, but you must reserve a space. An experimental station may be reserved up to three weeks in advance by signing a sheet posted just inside the laboratory door. There is also one computer simulation (Expt. 17) which is done on Blackboard (see login procedure on pg. 1).

To obtain credit, there is a certain minimum amount of each experiment which **must be completed during the lab period (see detailed instructions in lab manual)**. Once your lab is complete you must have the laboratory instructor sign and stamp your Lab Pass Sheet (back pages on your lab manual) which you take to the quiz room when making your first attempt at related quiz. Notice that the lab instructor does not assign a mark to your lab work, although he/she may refuse to accept it if he/she judges the work to be inadequate. Your understanding of the material is tested in the quiz on the associated Study Guide.

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<sup>1</sup>If you absolutely cannot stay to have your quiz marked, you may leave it. It will be marked at the end of the quiz period and the mark posted. It will be available for you to look at for two further quiz sessions.

You are encouraged to visit the lab early in the semester in order to see how it operates.

**Remember that, for Study Guides with an associated experiment, you cannot write the quiz until the experiment is stamped and signed as complete.**

## EVALUATION OF QUIZ MARKS

Quizzes are marked out of 10

Quiz marks    8/10 or higher receives 10%(highest possible mark)  
                  between 4.0/10 and 7.5/10 (inclusive) receives 2%<sup>†</sup>  
                  less than 4/10 receives zero

<sup>†</sup> This 2% mark does not add to a mark of 10. It is awarded on the condition you do not receive a “pass” on any attempt on a unit quiz. **Four examples below:**

- (i) A student earns 4.0/10 on the first quiz attempt, 6.0/10 on the second quiz attempt, and 8.0/10 on the third quiz attempt. Mark received: 10 out of 10.
- (ii) A student earns 4.0/10 on the first quiz attempt, 5.5/10 on the second quiz attempt, and 7.5/10 on the third quiz attempt. Mark received: 6 out of 10.
- (iii) A student earns 2.5/10 on the first quiz attempt, 4.0/10 on the second, and 7.5/10 on the third. Mark received: 4 out of 10.
- (iv) A student earns 7.5/10 on the first quiz attempt and tries no further quizzes. Mark received: 2 out of 10.

**SUMMARY OF MARKS: quiz marks 50% (5 x 10.0) + 50% (final exam) = 100%**

**ACCURACY OF RECORDS:** It is your responsibility to use Blackboard to check that your marks are recorded correctly. Please check your record often and report any discrepancies immediately to the Quiz Room Administrator (email address on pg. 1). As an aid, a 'Personal Record Form' is attached on page 10. You should use this form to record your quiz attempts, etc., and from time to time check the computer record against your personal record.

**ILLNESS:** If you are away for brief periods of time due to illness or for compassionate reasons, see the quiz room administrator re: consideration of extension of deadlines, etc. For an extended illness, etc. (> 1 week), you should obtain a medical certificate or similar documentation and consult the quiz room supervisor. If you miss the final examination because of illness or for other reasons, consult the Academic Consideration regulations in the current Undergraduate Calendar and see your Program Counsellor.

**COURSE NOTICES:** From time to time, notices pertaining to the course will be given in lectures and/or posted by the Quiz Room door or inside the quiz room. You should check weekly for notices and reminders, etc. **It is your responsibility** to keep yourself informed regarding these special announcements.

## OBTAINING HELP IN THE COURSE

- (a) **Room MacN 318 – Help Room.** The hours will be posted on Blackboard. The help room will open in week three. Help will be provided in the quiz room during weeks 1 and 2 as required.  
**NOTE:** This Help Room is for help in physics courses PHYS\*1070, 1080 and 1130.
- (b) Help may be obtained from the lecturer. **Short questions** can often be handled in the lecture room just before or after lectures. For other times, the lecturer's office hours will be announced in lecture.
- (c) Help may be obtained in rooms MacN 304A or 304. These are the lab rooms for this course and PHYS\*1070. When these rooms are open you may obtain help with course-related problems from the instructors, but remember that their first priority is to help students who are doing experiments and to check lab reports, etc.
- (d) The following items are available via Blackboard:
  - Several computerized tutorials are available. The useful tutorials for this course are:

Vectors	Exponential growth and decay	Logarithms
Trigonometry	Free body diagrams	Graphing log paper
Graphing simple functions	Dimensional analysis	Torque and rotational motion
  - A set of 3 final examinations from previous semesters.
  - Complete solutions to all Study Guide Self Tests.
  - Complete solutions for all the textbook problems on mechanics (Chapters 7-10) and for selected problems in the remaining chapters.



- Errata for the textbook and for the Study Guide/Lab Manual.

## THE PRETESTS

Before any Quiz can be written for credit, a **Pretest** must be taken and passed at the level of 60%. These **Pretests** are designed to permit a self-examination of the basic concepts and objectives of the modules in question. Each **Pretest** consists of a variety of simple questions in one of 4 formats:

1. multiple choice
2. true or false
3. pairwise matching
4. enter a number or symbol

The **Pretests** are delivered using Blackboard and so can be taken from any location which has computers connected to the internet (MacN 315, Library, home, etc.). Login instructions for Blackboard on pg. 1.

Follow the login instructions and the instructions which follow enabling you to take the **Pretest**. Upon completion it will be marked and an explanation provided for every question for which you selected the wrong answer. These should be studied carefully.

When you obtain at least 60% on the **Pretest** (allow 1 hour for your mark to process), you may then proceed to the Quiz Room (SCIE1101A) to write a **Quiz** for credit.

If you failed to get 60%, you must repeat the **Pretest** until 60% is obtained. A new version of the pretest will be available after 4 hours. Pretests are allowed every 4 hours. The Pretest must be recorded as a pass before a Quiz for credit may be written.

Of course, you get the maximum advantage from these Pretests if you do them without help and, as much as possible, without aids (textbook, etc.).

Also available on Blackboard is a **SAMPLE QUIZ** for each Study Guide, similar to quizzes that you will write in the Quiz Room.

**It is a serious academic offence to copy, print or otherwise store the pretest material or to attempt to alter it in any way.**

## PERSONAL RECORD

### PHYS\*1080 Physics For Life Sciences

**Student Name:** \_\_\_\_\_

**Semester:** \_\_\_\_\_

It is **strongly recommended** that you use this sheet to keep a personal record of your term work in this course. For each quiz attempt, record the date, time of day (AM 9:00-11:00, afternoon 1:00-3:00, version (A, B, etc.)), and result. Also record the date when each laboratory experiment is completed (i.e., your lab book is signed/stamped as complete).

This record will be **useful** when you check your record on Blackboard. On rare occasions, errors or omissions can be made in recording passed quizzes, etc. Therefore, from time to time, you should **check your record** on the computer, particularly **at or near the end of the semester**. **Remember, it is YOUR responsibility to ensure that your computer record is correct.**

You should also retain this record until you receive your final grade in the course. The record can be extremely useful to you and to the course instructor if you wish to have your final grade checked.

Quiz	Attempt #1 Date, version, mark received (0, 2 or 10)	Attempt #2 Date, version, mark received (0, 2 or 10)	Attempt #3 Date, version, mark received (0, 2 or 10)	Final mark received for unit (0,2,4,6 or 10)
Quiz #6				
Quiz #7				
Quiz #8				
Quiz #9				
Quiz #10				

**TOTAL QUIZ MARKS** \_\_\_\_\_

### LAB COMPLETION RECORD

Experiment #10	Experiment #12	Experiment #13	Experiment #14	Experiment #17
Date:	Date:	Date:	Date:	Date: