

PHYS*1080 Physics for Life Sciences

Fall 2016 Course Outline for Sections 1 & 2

University of Guelph
Department of Physics

Course Prerequisite: (1 of 4U Physics, OAC Physics, PHYS*1020, PHYS*1300), one 4U or OAC Mathematics course

Credit Weighting: 0.50 credits

Course Information

Description

Physics underpins most aspects of modern technology and medicine. For example, the development of the field of atomic physics resulted in sub-fields such as electronics, microchips and computers, nuclear medicine and radiation treatment of cancers. This course provides an overview of topics in physics that are of particular importance to the life and biological sciences. The specific topics chosen for PHYS*1080 (mechanics with an emphasis on fluid mechanics) make it particularly suited for students in the biological sciences or environmental science.

Course Goals

The primary goal of this course is the presentation of selected principles and topics in physics with applications to living organisms. A second goal is the enhancement of skills in quantitative analysis and problem solving. Further, the method of presentation (modules, study guide) develops skills in time management, self-study and self motivation. At the conclusion of the course the student will have increased awareness of how the principles and methods of physics are applicable to living systems.

Learning Outcomes

This is not a complete list of all you will be asked to study and encouraged to learn. However, after successfully completing this lecture and laboratory course you should at least be able to:

1. Demonstrate the ability to think critically and to use appropriate concepts to analyze qualitatively problems or situations involving the fundamental principles of physics.
2. Demonstrate the ability to use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
3. Demonstrate basic experimental skills by the practice of setting up and conducting an experiment with due regards to minimizing measurement error.

4. Demonstrate basic communication skills by working in groups on laboratory experiments and the thoughtful discussion and interpretation of data.

Required Material

1. **Textbook:** *PHYSICS FOR THE BIOLOGICAL SCIENCES, 5TH EDITION*, Williams M.L, Sullivan D.E, Renninger G.H, McFarland E.L, Hunt J.L. Available in the Campus Bookstore (1st floor MacNaughton).
2. **Study Guide/Laboratory Manual (2016 printing):** **Available for purchase in the Quiz room(SSC1101A)only** (\$20.00, cash only. Exact change appreciated)

The Quiz Room will be open for the sale of manuals on Thursday and Friday September 8 and 9 and Monday to Wednesday September 12,13,14 from 9am to 12pm and 1pm to 4pm. After January 14 this item may be purchased in the Quiz Room during normal Quiz Room daytime hours as posted on Courselink.

3. **i-Clicker Student Response Unit (optional)** – available in the University Bookstore. A Classroom Response System will be used this semester where students use Personal Response Units (commonly known as “clickers”) to register their responses to questions posed in class.
4. **Calculator** (get one with trig functions, e^x , etc.) (**Cell phones, graphing calculators, programmable calculators, and electronic devices are strictly prohibited from the quiz room and labs. They must remain off and in your backpacks during your entire quiz/lab room attendance. Failure to comply is considered a form of academic misconduct and can/will result in a minimum penalty of automatic quiz disqualification**).

Note: *This course outline includes important dates and deadlines and should be read in its entirety.*

Course Access

Students in this course are required to access **Courselink (D2L)** to write **required** Pretests, perform a simulated experiment on diffusion for Study Guide 17, and keep track of their semester marks. **As soon as possible, you should log-in to Courselink and establish a course profile:**

- * Use a web browser to go to the Courselink website: <https://courselink.uoquelfh.ca>
- * Follow the Courselink login instructions.

In addition to the pretests and the experiment for Study Guide 17, the following items are also available via Courselink:

- a. **Solutions to Self-Tests** in the Study Guides
- b. Two **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 page 11)

- e. **Errata** for the textbook.
- f. **One sample quiz** for each Study Guide.

Room Locations and Operating Hours

Quiz Room Location: SSC 1101A

Laboratory Location: MacN 304 and 304A

Physics Help Room: MacN318

Quiz Room Hours: Posted on Courselink – see “Quiz Room Operating Hours”

Lab Room Hours: Posted on Courselink – see “Lab Sign-in Program”

Extra opening times may be added depending on enrolment.

Course Administration

Main Course Contact:

Quiz Room Supervisor	Office	Extension	Email
Cindy Wells	SSC1101A	52445	cwells@uoguelph.ca

Please contact the Quiz Room Supervisor with all course related inquiries and email to report any illness or errors in your Courselink record.

Instructors:

Instructor	Office	Extension	Email
The great Orbax	MacN328	52625	orbax@uoguelph.ca
Mike Massa	MacN328	52625	massam@uoguelph.ca

Lecture Sections:

Section	Day	Time	Location
01	Tuesday, Thursday	1:00pm – 2:20pm	ROZH 101
02	Tuesday, Thursday	2:30pm – 3:50pm	MACN105

Tentative Lecture Schedule:

Week	Lecture	Week of	Topic(s)	Study Guide
0 & 1	1-3	September 8,9 September 12-16	- Kinematics, - Forces	9,10
2	4-5	September 19	- Forces and Torques - Momentum, Work & Energy	10
3	6-7	September 26	- Energy, Rotational Motion	11
4	8-9	October 3	- Rotational Motion	11
5	10	October 12	- Elasticity - Scaling	12
6	11-12	October 17	- Pressure	13
7	13-14	October 24	- Barometric equation, surface tension - Non-Viscous Fluid Flow	13,14
8	15-16	October 30	- Viscous Fluid Flow - Pulsatile Flow, Bolus Flow, Turbulence	14,15
9	17-18	November 7	- Turbulence, Aneurysms - Perrin's Experiment	15,16
10	19-20	November 14	- Sedimentation - Diffusion	16, 17
11	21-22	November 21	- Osmotic Pressure - Heat	17, 18
12	23-24	November 28	- Heat - Review, Info re Final Exams	18

Note: The information in the "Lecture Topic" column is provided as a rough guide for the term. Future announcements about changes to the table or of any kind will be made in class and posted on Courselink; these announcements take precedence over the original course outline!

Course Assessment

Assessment	Weight
Quizzes (5 x10%) (see page 9 for information on quiz deadlines and topics)	50%
Final Exam	50%

Evaluation of Quizzes:

Quizzes are marked out of 10 points

A score of 8/10 or higher receives 10% of the course grade (highest possible mark per unit or a “pass”). Scores between 4.0/10 and 7/10 (inclusive) receive 2% per attempt, and less than 4/10 receive zero

The partial mark of 2% 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. See the examples below.

Examples:

1. 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%.
2. 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%.
3. 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%.
4. A student earns 7.5/10 on the first quiz attempt and tries no further quizzes. Mark received: 2%.

Final Examination:

The final examination typically consists of 18 - 25 **multiple-choice questions** of equal weight. Usually there are 2-3 questions from each of the SGs. Sample final exams are available through Courselink (D2L)

The copy of the **formula sheet** used for writing quizzes and also found in your Study Guide is attached to the final exam.

It should be noted that many students have found the final examination difficult, even with a perfect mark on the Quizzes.

Final Exam Date: December 12, 2016 from 11:30am – 1:30pm. Location TBA

Midterms: There are **no midterms** for this course

Course Structure

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 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 Courselink and the door to the Quiz Room** for important weekly notices regarding the course.

Study Guide

The Study Guide (SG) contains the **ten modules** (Study Guides 9 to 18) for this course, which are summarized on page 9 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, still attend labs). 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.

Diagnostic Quizzes

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?" Whenever 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. There are 5 quizzes to be completed and they are designed to test your mastery of the material. There is no quiz on Study Guide 18, although there will be at least 2 questions on Study Guide 18 on the final examination. A **sample quiz** for each Study Guide module is available on Courselink. However, there are far more study guide topics than there are quizzes that you are expected to write. Consequently, most quizzes have been combined to include questions from two study guides. For example, Quiz #6 contains questions from Kinematics, Newton's Laws, Momentum & Energy and Experiment 10. It is therefore very **important that you come prepared for both** study guides and have passed the pretest. 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. 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 feedback 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 a grade of 80% or above, i.e., **the "pass mark" is 8.0 out of 10.0**. Please see the "Course Assessment" section on page 5.

Each quiz 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 single group, and this has been set at **three**. **Also, you may not attempt more than one quiz on any given module 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 of the Study Guide before the Lab Manual section. You should visit the quiz room during the first week of the semester to see how the system operates.

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.

Note 1: Quizzes are withdrawn on specific dates (see deadlines page 9), 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.

Note 2: Graphing Review Tutorial

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 Courselink) and also read the “Graphing Hints” at the beginning of the lab experiments section in the Study Guide and Lab Manual.

Pretests

Before any quiz can be written for credit, a Pretest must be taken and passed at the minimum level of **60%**. These Pretests are designed to permit a self-examination of the **basic concepts and objectives** of the modules in question. **They are a necessary but not sufficient preparation to pass a quiz.** 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 via Courselink. Follow the login instructions outlined on page 2 and this will enable 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 (SSC1101A) to write a quiz for credit.

If you failed to get 60%, you must repeat the Pretest until 60% is obtained. Pretests attempts are unlimited. The Pretest must be recorded in your course record as a pass before a Quiz for credit may be written.

There is a Pretest available for Study Guide 18 even though there is no quiz. This is strongly recommended for study purposes for the final exam.

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.).

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

Labs

There are 5 experiments to be completed, associated with Study Guide units 10,11,12, 13,14 and 17 (see page 4 of the outline). Four of these experiments are done in the lab rooms (MacN 304 & 304A) and they **may be performed in any order** (see Courselink

for hours of operation). The laboratory operates as an open lab, but you **must reserve a 1.5 hour lab session** by signing up on-line via Courselink. This is sufficient time to complete the entire lab (data and calculations). It is mandatory to sign-up for labs early in the semester and **create your own lab schedule**, print out a copy and staple it inside your lab manual as proof of your scheduled lab. There is also one computer simulation (Experiment 17) which is done on Courselink.

Once your lab is **complete** (data and calculations) you must have **the laboratory instructor sign and stamp your Lab**. **You will tear off the signed/sealed portion and take it to the quiz room when making your first attempt at related quiz**. Note 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.

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

Quiz Deadlines & Requirements for Sections 01 and 02 ONLY

Week	Date	Notes
1	Thursday, September 8	Quiz Room Opens for Writing
4	Friday, October 7	Last day for Quiz #6 Requirements: <ol style="list-style-type: none"> 1. Pretest 6 (on-line) 2. Kinematics (Study Guide 9) 3. Newton's Laws, Momentum & Energy (Study Guide 10) 4. Experiment 10 – Forces and Torques: Equilibrium (MacN304A)
6	Friday October 21	Last day for Quiz #7 Requirements: <ol style="list-style-type: none"> 1. Pretest 7 (on-line) 2. Rotational Motion (Study Guide 11)
8	Friday, November 4	Last day for Quiz #8 Requirements: <ol style="list-style-type: none"> 1. Pretest 8 (on-line) 2. Elasticity & Scaling. (Study Guide 12) 3. Experiment 12 – Elasticity (MacN 304A) 4. Pressure & Surface Tension (Study Guide 13) 5. Experiment 13 – Density and Surface

Week	Date	Notes
		Tension of Liquids (MacN304A)
10	Friday, November 18	Last day for Quiz #9 Requirements: <ol style="list-style-type: none"> 1. Pretest 9 (on-line) 2. Fluids in Motion (Study Guide 14) 3. Experiment 14 – Viscosity of Liquids (MacN304A) 4. Turbulent Flow (Study Guide 15)
10	Friday, November 18	Lab Rooms Close
12	Friday, December 2	Last day for Quiz #10 Requirements: <ol style="list-style-type: none"> 1. Pretest 10 (on-line) 2. Boltzmann Eq'n & Sedimentation (Study Guide 16) 3. Diffusion, Osmotic Pressure (Study Guide 17) 4. Experiment 17 – Diffusion (computer on line lab)
12	Friday, December 2	Quiz Room closes at 4:00pm

Obtaining Course Help

- a) **The Physics Help Room is located on the 3rd floor of MacNaughton, MacN318, and opens in week three.** The open hours are posted on Courselink. Help will be provided in the quiz room during weeks 1 and 2 (see News Item on Courselink).
- 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 304 or 304A. These are the lab rooms for this course. 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 labs.
- d) The following items are available via Courselink:
- a. A set of 2 final examinations from previous semesters.
 - b. Complete solutions to all Study Guide Self Tests.
 - c. Complete solutions for all the textbook problems on mechanics (Chapters 7-10) and for selected problems in the remaining chapters.
 - d. Errata for the textbook.
 - e. Several computerized **tutorials are available**. The useful tutorials for this course are:

i. Vectors	v. Free body diagrams
ii. Exponential growth and decay	vi. Graphing log paper
iii. Logarithms	vii. Graphing simple functions
iv. Trigonometry	viii. Dimensional analysis
	ix. Torque and rotational motion

Laboratory Operation & Protocols

- **Lab experiment sign up is done on-line via Courselink.** Begin your labs as soon as possible. It is recommended that you start the lab portion of this course during the first couple of weeks of the semester. It is mandatory that you sign up for all your labs and create your own personal lab schedule early in the semester to ensure that all labs can be completed by the lab quiz deadline dates (plan carefully). Print a copy of your lab schedule and staple it inside your lab manual as your lab TA may ask for it if more than the maximum number of students show up for a booked station. Only those signed up to a station will be allowed in the lab. You must attend all of your scheduled labs.
- **Please note:** lab sign-up is restricted to 1.5 hour time slots which is sufficient time to collect the required data and complete your calculations. You are required to be familiar with the lab material before arriving to ensure completion within the 1.5 hour session. A completion TA signature and seal is mandatory prior to leaving the lab. Once you have completed the lab data and calculations and obtained a TA signature/seal you will tear off that signed/sealed portion and hand it at the Quiz Room when making your first attempt at the related quiz.

Quiz Room Operation & Protocols

- Students must show their U of G photo ID card in order to write a quiz.

- All quizzes are available from week 1 and they can be written as early as you want. The **deadline dates only reflect the last possible date that particular quiz is available to be written.**
- **No credit will be granted for labs or quizzes completed during a previous semester.**
- Only 1 quiz attempt per time slot allowed for any quiz unit.
- Your 1st attempt should be at least 3 time slots before the deadline to allow for a possible 2nd or 3rd attempt. . **NOTE: evening sessions take a max. of 250 students and will close when that number is reached.**
- 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 periods.
- Wait quietly to have your quiz graded by the TA's. If you miss hearing your name your quiz will be graded in your absence.
- Pretests must be passed with a minimum of 60% before the required quiz is attempted. Allow at least 1 hour for your Pretest grade to be processed.
- All electronic devices must be concealed while in the quiz and lab rooms ie, cell phones, lap tops, ipods, tablets etc.
- **All quizzes remain in the quiz room and MUST be handed in for marking.**
- **No material in the form of quizzes or papers may be taken from the Quiz Room and all paper used when writing a quiz must be turned in.**
- **Book Bag Lock (optional)** – Book bags are **not** allowed to be taken to your quiz writing station in the quiz room. The designated area for book bags is equipped with cables for locking (**you must bring your own lock**).
- **Lost and Found:** "Lost and Found" receptacle is located in the Quiz Room (SSC 1101A).

Course and University Policies

Academic Misconduct

The University of Guelph takes a serious view of academic misconduct and will severely penalize students, faculty and staff who are found guilty of offences associated with misappropriation of others' work, misrepresentation of personal performance and fraud, improper access to scholarly resources, and obstructing others in pursuit of their academic endeavors. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work

before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. Each student is assumed to be familiar with the regulations surrounding academic misconducts, as spelled out in the Undergraduate Calendar academic misconduct section.

"In this course, your instructor will be using Turnitin, integrated with the CourseLink Dropbox tool, to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph.

All submitted assignments will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site."

Accuracy of Records

It is your responsibility to use Courselink to check that your marks are recorded correctly. Please check your record often and report any discrepancies immediately to the Quiz Room Supervisor (email address on page 3). As an aid, a 'Personal Record Form' is provided on Courselink. 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 medical, psychological or compassionate reasons, see or email the Quiz Room Supervisor **immediately** (email address on page 3) about consideration of extension of deadlines, etc. (Do not wait until the end of the semester to submit your documentation). For an extended illness, etc. (> 1 week), you should obtain a medical certificate or similar documentation and consult the Quiz Room Supervisor or the instructor. If you miss the final examination because of illness or for other reasons, consult regulations in the current Undergraduate Calendar.

Course Notices

From time to time, notices pertaining to the course will be posted on Courselink, given in lectures and/or posted by the Quiz Room door or inside the quiz room (SSC1101A). You should check this door and room weekly for notices and reminders, etc. **It is your responsibility** to keep yourself informed regarding these special announcements.

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Drop Date

The last date to drop one-semester courses, without academic penalty, is **Friday, November 4**. For regulations and procedures for Dropping Courses, see the [Undergraduate Calendar "Dropping Courses" section](#).

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or refer to the [SAS website](#).

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Material recorded with permission is restricted to use for that course unless further permission is granted.

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."

Course Evaluation

The Department of Physics requires student assessment of all courses taught by the Department. These assessments provide essential feedback to faculty on their teaching by identifying both strengths and possible areas of improvement. In addition, annual student assessment of teaching provides part of the information used by the

Department Tenure and Promotion Committee in evaluating the faculty member's contribution in the area of teaching.

The Department's teaching evaluation questionnaire invites student response both through numerically quantifiable data, and written student comments. In conformity with University of Guelph Faculty Policy, the Department Tenure and Promotions Committee only considers comments signed by students. Your instructor will see all signed and unsigned comments after final grades are submitted. Written student comments may also be used in support of a nomination for internal and external teaching awards.

NOTE: No information will be passed on to the instructor until after the final grades have been submitted.