

PHYA21H
Introduction to Physics IIA
(*Physics for the Physical Sciences*)

Prof. J. Lowman
julian.lowman@utoronto.ca

COURSE DESCRIPTION:

This course covers the main concepts required for an understanding of Longitudinal and Transverse Waves, Electricity and Magnetism and Special Relativity. It provides an introduction to these topics with particular emphasis on developing a mathematical framework for problem solving and analysis. However, many important breakthroughs in the understanding of physics have resulted from observation. Consequently, there will also an emphasis on empirical work as well theoretical investigation.

Physics is, arguably, the most fundamental branch of science, and in some ways it is the most simple. Physicists start with a big, often complicated, problem and they first simplify it as much as they possibly can. Once simplified they try to analyze the situation. They then gradually introduce more complications, one at a time, until they eventually end up with a model that can be applied to situations encountered in nature.

LECTURES:

Lecture slides will be posted online. They will be supplemented in class practicals by worked examples of problems. These may not be posted online. Lectures will be presented using Blackboard Collaborate. The course Quercus page includes a link to Blackboard.

All course lectures will be presented in synchronous sessions: Tuesdays from 4-6pm and Thursdays from 4-5pm. The lectures will be recorded, as presented, and will be available for viewing on demand through the Blackboard Collaborate link. However, the recording files will not be downloadable. In other words, you will only be able to view them using a browser with an active internet connection.

Lectures will often be structured on the assumption that you have read the textbook prior to the lecture. Please see the lecture/reading guide later in this document.

PRACTICALS:

Practicals start in Week 2 of the course (week of Jan. 18).

Students registered in the course are expected to enroll in one practical session. Practical sessions will vary in length each week between two and three hours. However, the start times will not vary and the sessions will be synchronous. Practical sessions are not recorded. Unlike the lectures, attendance at the practicals is expected. Moreover, you must attend the practical that you are enrolled in, you can and will be asked to leave practical classes that you are not enrolled in.

FACILITATED STUDY GROUP (FSG) RESOURCES:

In general, the Teaching Assistants (TAs) that support this course are not available outside of Practical sessions. However, the course is supported by a Facilitated Study Group leader. This role is filled by a more experienced and knowledgeable undergraduate student who will be available to answer questions on a weekly basis in a tutorial-like setting. Further announcements will be made regarding how to contact and meet online with the FSG leader. Unlike TAs, the FSG is not involved in marking student papers. Please observe the limited time obligations of the course TAs and refrain from sending them e-mails.

COURSE MATERIAL:

Fundamentals of Physics (Volume I and II) Halliday and Resnick. The first volume includes material on Waves and the second volume includes the material on Electricity and Magnetism and Special Relativity included in this course.

You do NOT need to purchase a lab manual for this course!

OFFICE HOURS:

A time for regular Office Hours conducted via a Zoom link will be determined in the first week of the course. Due to the online format of the course, it will be necessary to do group Office Hours in general, so that all students interested in office hours can log on and discuss the course with me and fellow students in a group. It may be possible to schedule other office hours at different times. Please setup an appointment via e-mail (see next), and expect it to take a few days (so don't wait until the day before a test to try to meet).

E-MAIL:

It is very important that students read and understand this section.

You must include "PHYA21" in the subject line. Only e-mail sent from official University of Toronto mail accounts will be acknowledged (i.e., no g-mail etc). For questions about the course content and schedule, please use the Discussion Board on Quercus. Why do I insist on this? For one thing, another student might answer you more quickly than I can. However, in particular you can see each others questions with the posted answer. This means I won't receive multiple e-mails asking the same question and it also means that all students will see the same answer - thus you won't

wonder if somebody else got a more thorough (i.e., better) answer. What I do encourage, is to post a question on Quercus and then send me an e-mail with the subject “PHYA21: I’ve just posted a question”. In that case you’ll get a quicker response and the dialogue will remain transparent to the entire class.

For medical and other personal issues affecting your participation in the course, please feel free to contact me via e-mail. Don’t expect immediate responses, however, if I do not reply within 48 hours, you should send me a reminder e-mail - as my Inbox can get rather full. Please keep in mind that I typically get 30-40 emails a day and do many things as a Professor besides teaching this one course. Again, always include PHYA21 in the subject and your full name at the end of the e-mail.

ASSESSMENT:

FINAL EXAM:	40%
MIDTERM:	20%
PRACTICAL QUIZZES:	10% in total
OUT OF CLASS PROBLEM ASSIGNMENTS:	10% in total
PRACTICAL WORK:	20% in total

MIDTERM AND EXAM:

Both the term test and final exam will draw from the lectures, practicals and textbook. This could include material presented in the lectures or practical material that is not covered in the textbook. It could also include assigned reading material that was covered in the textbook but not explicitly discussed in lectures. It will not include material from sections of the book that were not assigned reading.

The midterm will be an online “open book” test with a two hour time-limit.

PRACTICAL QUIZZES:

Due to the restrictions placed on practical work by the online environment, the nature of the assessments may evolve as the term goes on. In general, expect that you will have quizzes to complete throughout the term. Quiz timing is still to be determined in such a way as to preserve academic integrity.

ASSIGNMENTS:

There will be four assignments handed out during the term. These will feature slightly more involved problems than those you will be doing in the practicals or on the quizzes. You will be given two weeks for each assignment and, most importantly, this must be your own work. That is, each student will receive a mark as an individual. Of course, it is fine to discuss the problems with your classmates but solutions must not be copied. Plagiarism will incur strict penalties as provided by the University’s policy on Academic Dishonesty.

Assignments will be handed-in to an online drop box on Quercus. Students must submit their

assignments in pdf format. This can be done by photographing the pages of hand-written solutions or by typing out the solutions. The easiest procedure for creating submission files appears to be photographing the pages with a mobile-phone camera and then concatenating the photos in a single file saved in pdf format. Assignments submitted late will receive a penalty of 50% after 5pm on the due date up until 5pm the next day. Assignments received after this will get a mark of zero. Thus it is frequently best practice to submit an incomplete assignment on time rather than continuing to work on a late assignment. Assignments will be marked by your practical leader (course TA).

PRACTICALS:

There will be ten (10) weeks of Practicals.

The Practicals will focus on problem-solving. Each week, the activities you are asked to do will be graded. Thus every week's Practical will generate grades. These marks will sum up to your 10% grade for Practical work.

PROBLEMS?

If you see a potential problem with your ability to participate in the course or the assessment methods you can e-mail me or contact the people at *ACCESSAbility* Services who can advise us both regarding accommodation.

LECTURE SCHEDULE

- Week 1 – Wave Speed, Interference, Standing Waves (Chapter 16:1,2,5,7)
- Week 2 – Sound Waves, Intensity, Beats & Doppler Effect (Chapter 17:1-7)
- Week 3 – Electric Charges, Forces and Fields (Chapter 21:1-3, 22:1-3)
- Week 4 – Continuous Distributions, Potential and Motion (Chapter 22:4-7, 24:1-2)
- Week 5 – Electrical Potential and Potential Energy, Multiple Charges (Chapter 24:3-8)
- READING WEEK
- Week 6 – Capacitance, Dielectrics, Resistance and Current (Chapter 25:1-5, 26:1-5)
- Week 7 – Circuit Laws, Circuits with Resistors and Capacitors (Chapter 27:1-4)
- Week 8 – Magnetism, Currents, Magnetic Fields and Forces (Chapter 28:1-8, 29:1-5)
- Week 9 – Induction, Magnetic Flux, Electromagnetic Waves (Chapter 30:1-4, 33:1)
- Week 10 – Interference of Light, Diffraction, Time (Chapter 35:1-3, 36:1-3, 37:1)
- Week 11 – Time Dilation, Length Contraction, Lorentz Transformations (Chapter 37:1-4)
- Week 12 – Doppler for Light, Relativistic Momentum and Energy (Chapter 37:5-6)

ACADEMIC INTEGRITY AND RESPECT FOR THE ACADEMIC ENDEAVOUR

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's *Code of Behaviour on Academic Matters*:

<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

- In papers and assignments: Using someone else's ideas or words without appropriate acknowledgement; submitting your own work in more than one course without the permission of the instructor; making up sources or facts; obtaining or providing unauthorized assistance on any assignment.
- On tests and exams: Using or possessing unauthorized aids; looking at someone else's answers during an exam or test; misrepresenting your identity.
- In academic work: Falsifying institutional documents or grades; falsifying or altering any documentation required by the University, including (but not limited to) doctors' notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the *Code of Behaviour on Academic Matters*. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <https://www.uts.utoronto.ca/ctl/academic-integrity>).