

## PHYA10H3F-2022: Physics I for the Physical Sciences

### Lectures & Practicals are all *in person*

*“I think nature’s imagination is so much greater than man’s, she’s never going to let us relax” – Richard Feynman”*

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**Lectures (in SY110):** Tuesday 15.00-16.00 and Thursday 15.00-17.00

**Office Hours:** Tuesday 12.00-14.00

**Course website:** <https://www.uts.utoronto.ca/projects/quercus/>

### Course Description:

This is the first course for many of the Specialist and Major programs in Physical and Environmental Sciences. The course introduces the concepts, mathematical tools, and above all, methods of reasoning and problem-solving that physicists use to understand and describe the physical world, which are also used in many other areas of science, technology, and engineering. Topics include the mathematical description of motion (i.e., kinematics and dynamics), Newton’s laws, energy and work, momentum, conservation laws, rigid-body rotation, oscillatory motion, and wave phenomena. By the end of the course, you should have considerable experience in using all these tools and concepts to solve problems and you should be fluent not only in employing the abstract language of physics but in relating those abstractions to the real world which they are designed to help interpret and describe.

**Course Prerequisites:** Calculus and Vectors (MCV4U), Physics (SPH4U)

**Corequisite:** Calculus I (MATA30 or MATA31)

### Required materials:

**Textbook:** **Fundamentals of Physics by Halliday, Resnick, & Walker (Wiley, 12th Ed.)**, Students who are familiar with the textbook **Physics for Scientists and Engineers by Randall D. Knight (Pearson, 4<sup>th</sup> ed.)** still can use it, but Assignments will follow the book **Fundamentals of Physics** using **WielyPLUS**. The chapters’ numbers listed in the **Tentative Schedule Winter-2022 section** below corresponds to this textbook, which can be easily matched to those listed by the another book.

**Non-Programmable Scientific Calculator:** Some suitable models include Casio FX-260, FX-300, Texas Instruments TI-30X IIS, TI-30XS, Sharp EL-520, EL-531, EL-W535, or similar.

## Grading Scheme

Component	Points	Due Date
Quizzes	04	In practicals, the week before Tests.
Practical Activities	12	Weekly (practical sessions, including Quizzes)
Formal Lab Reports	05	Week 8 & 11 (tentative)
Midterm Test 1	10	Possibly Week 5 TBA by Registrar office
Midterm Test 2	18	Possibly Week 10 TBA by Registrar office
Assignments	03	Check WielyPLUS for due dates
Final Examination	48	Exam Period April (Registrar decision)

### Assignments (3%)

You are encouraged to do the assigned problems from the end chapters in the textbook, which you will find on WielyPLUS. No extension will be granted after the due date for any reason since you have a week to do them. Also, you are encouraged to do more problems and to be selective working on problems that are different. How many? It is probably impossible to answer this, as it depends on the student and the topic at hand. I suggest you should spend about 3 hours doing each HW. You are encouraged to do it for practicing problem solving for better understanding.

### Practical Sessions (21%)

In these 3-hour weekly sessions you will work in groups to discuss examples based on the concepts introduced in the lecture and textbook readings. **You are expected to attend these sessions missing five of practical session you will be assigned a zero/20 for the practical grade.** There will also be experimental work (Video & data files will be provided if necessary) to develop skills in experimental technique and data analysis. The total practical grade will depend on quizzes (3%), practical group activities (12%) and two experiment-based formal lab reports written in collaboration with your assigned group **for the first report (1%) & individually for the second (4%)**. Your TA will provide you with more information about the **practical organization and the students groups** to be formed.

### Midterm Test #1 & Test #2 (10% & 18%)

The two tests will be for 1.5 hour long each, scheduled by the Registrar office online. Test-1 will cover material discussed in lecture, readings, and practical sessions up to the previous week. The only aids allowed are a non-programmable calculator and a **hand-written**, double-sided, letter-sized aid sheet which you prepare individually beforehand, which includes maximum of 25 equations with no solved problems, graphs, or explanation. Do not include constants as those are given. **You will need to submit the used formula sheet with your test & Exam papers.**

Test#2 will cover material discussed in lecture, readings, and practical sessions up to the previous week. It will be cumulative and may include material covered since the beginning of the course but with an emphasis on material not covered in Test-1. The only aids allowed are a non-programmable calculator and a **hand-written**, double-sided, letter-sized aid sheet which you prepare individually beforehand, which includes maximum of 35 equations with no solved problems, graphs, or explanation. Do not include constants as those are given. **You will need to submit the used formula sheet with your test & Exam paper for both tests & Exam.**

### Final Examination (48%)

The final examination will be scheduled during the exam period in April and will cover material from the entire course. It will be a cumulative 3 hours long and online. The only aids allowed are a non-programmable calculator and a **hand-written**, double-sided, letter-sized aid sheet which

you prepare individually beforehand, which includes maximum of 40 equations with no solved problems, graphs, or explanation. Do not include constants as those are given.

## Communication Via e-mail

If you want to ask a question via e-mail, please first check the electronic forums in the Discussion Board of the course website. Quite likely, you are not the only person with that same question, and if that question has already been asked, you will find the answer there. If the question has not been asked, go ahead, and post it yourself instead of sending it by e-mail. This way you will also help other students facing the same issue. The forums in the discussion board are monitored regularly by the course instructor and your peers, making it the best way of communicating for various queries of a diverse nature.

However, if the electronic forums are not the best place for your query, please send your e-mail from an official utoronto.ca address (e.g., your UTmail+ account), as other addresses might create problems with automatic filtering. Include the course code PHYA10 somewhere in the subject line of your message to ensure a quicker response time. I make no iron-clad guarantees, but I will generally try to respond to e-mails within about 36 hours, possibly excepting weekends.

## Absences

To ensure fairness and reduce scheduling chaos, there will ***be no makeup options for practical activities, formal lab reports, or midterm tests.*** In the case of a ***valid and documented problem that supports an absence from a practical session, the grade will be calculated based on all other submitted work.*** In the case of a valid and documented problem that supports an absence from the first test, the second test will have its weight increased accordingly. In the case of a valid and documented problem that supports an absence from the second test, the final examination will have its weight increased accordingly. If the problem is health-related you must use the official form available on the Registrar's Website.

## Academic Integrity

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 Behavior on Academic Matters:

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

outlines the behaviors 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 acknowledgment; 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; using someone else's clicker or multiple clickers for participation grades.
- 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) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. You should familiarize yourself with the University's

standards of conduct. 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 <http://sites.utoronto.ca/academicintegrity/resourcesforstudents.html>).

## Additional Resources

### Physics Study Centre (PSC)

The Environmental and Physical Sciences students' Association (EPSA) and the Department of Physical and Environmental Sciences (DPES) are offering an online tutoring environment. Selected outstanding volunteer students will be available to offer help with Physics questions and problems. More information will be available at <https://www.myepsa.ca/tutoring/physics-centre/>

### Facilitated Study Groups (FSG)

Facilitated Study Groups are structured, weekly study groups for this class and other selected UTSC classes. Students share study strategies, compare notes and strategize for exams in a low-key, comfortable environment. FSG days and times will be announced in the course website. Everyone is welcome!

### Accessibility

Students with diverse learning styles and needs are welcome in this course. If you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the *accessibility* Services Office as soon as possible. I will work with you and *accessibility* Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC *accessibility* Services staff (located in SW302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or <https://www.utsc.utoronto.ca/ability/welcome-accessability-services>

### Discussion Board

The course website supports electronic forums useful for questions and discussions on course content, conceptual, and detailed problems, textbook readings, as well as any issues relating to administrative details of the course such as deadlines, future topics, and scheduling. It is recommended that you check the forums on a regular basis to keep on top of current issues. You can subscribe to the various forums to receive email notifications when new posts are available, and there are also options for posting anonymously.

### Lecture Slides

Slides from the lectures will be made available on the course website after each lecture. These are intended to assist with review and reference and are *not* intended to replace participation in lecture or the textbook. They should not necessarily be viewed as a full transcript of what was discussed.

## Tentative Schedule - Fall-2022/23:

Note that the following schedule might possibly change during the term to accommodate variations in the pace of lecture discussions. The dates of term tests are tentative subject to Registrar's schedule and will be confirmed after the beginning of the semester. You should read the assigned chapters *before* each lecture to ensure a basic familiarity with the topics to be discussed, and subsequently use them as a reference while working on homework, preparing for tests, etc.

Weeks		
Week-1	Introduction & Dimensional Analysis	<i>Chapter-1 (Measurements) &amp; Chapter-2 (Motion in 1D) Review!</i>
Week-2	Vectors and Coordinates Ch.3: 1-3	Motion in 2D & 3D CH.4: 1-4
Week-3	Motion in 2D & 3D CH.4: 5-7	Newton and Forces-I Ch.5: 1
Week-4	Newton and Forces-I Ch.5: 2-3	Newton and Forces-II Ch.6: 1-3
Week-5	Newton and Forces Ch 5 & 6 Applications	Work and Kinetic Energy Ch. 7: 1-5
TBA	<b>Test 1: Ch. 1-6</b>	
Week-6	Potential Energy & Conservation of Energy Ch.8: 1-5	Center of Mass and Linear Momentum Ch.9: 1-5
Week-7	<b>Reading Week</b>	
Week-8	Momentum & Kinetic Energy in Collision Ch.9: 6-9	Review Momentum & Energy Ch 9 & 10
Week-9	Rotation & Torque Ch. 10: 1-5	Rotational Dynamics & Rotational Energy Ch. 10: 6-8
Week-10	Angular Momentum Ch. 11: 1-5	Dynamics & Angular Momentum Conservation Ch. 11: 6-8
Week- 11	Simple Harmonic Motion Ch.15: 1-4	The Pendulum Ch.15: 5
TBA	<b>Test 2: Ch. 1-12</b>	
Week-12	Waves & wave Equation Ch. 16: 1-4	Sound & Interference Ch.17: 1-5 Time permitting
Week-13	Doppler Effect Ch.17: 6-7	
Dec 9-21 TBA	<b>Final Exam</b>	

### **In class conduct:**

The following policies are for the purpose of minimizing unwanted distractions for your fellow students:

- Class starts at 3:10pm on Tuesdays & Wednesdays. Late arrival or early departure may affect your colleagues. If you must arrive late for unavoidable reasons or leave early, please be considerate of your colleagues by entering quietly and minimizing disruption as much as possible.
- Please put away all electronic devices that are not being used for a task specifically related to what we are doing in class.
- Do not bring food into the classroom as this can create unwanted distractions. Liquids in spill-proof containers (bottles with lids, travel mugs, etc.) are fine.