

PHY A10 -- Winter 2019

Physics I for the Physical Sciences

Tuesday 3:00 pm – 5:00 pm, SW128

Wednesday 9:00 am – 10:00 am, SW143

“Consider a spherical cow...”

- pretty much every physicist ever

Instructor: Patrick McGraw **Email:** patrick.mcgraw@utoronto.ca

Office: SW504E (temporary--- change TBA)

Office Hours: Tuesday 5:10 pm-6:10 pm, Wednesday 10:10am-12 noon

Course website: portal.utoronto.ca

Course Description:

This is the first course for many of the Specialist and Major programs in Physical and Environmental Sciences. The course provides an introduction to the concepts, mathematical tools, and above all, methods of reasoning and problem-solving that physicists use to understand and describe the physical world and 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 of 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: Physics for Scientists and Engineers by Randall D. Knight (Pearson, 4th ed.)

Mobile device or laptop for use in participation questions during lecture (more details about setting up your device will be on the course website)

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
Participation	7	Weekly (lectures)
Online Homework	7	Weekly, due each Tuesday 11:59 pm
Practical Activities	10	Weekly (practical sessions)
Formal Lab Reports	10	Week 8 & 12
Midterm Test 1	10	Week 5 TBA
Midterm Test 2	20	Week 10 TBA
Final Examination	36	Exam Period Apr 10-27

Participation (7%)

During each lecture there will be questions which you can respond to via your mobile device or laptop. During each lecture you can earn 1 point by answering at least 75% of the questions during that lecture, and these add up cumulatively up to a maximum of 20 points. Some questions will also be designated (after lecture) as performance questions--- you can earn an additional 2 points by *correctly* answering at least 50% of the performance questions during the semester. These points (a total possible of 22) comprise your participation mark for the course.

Online Homework (7%)

A set of questions will be posted weekly on MasteringPhysics, based on the previous week's textbook reading and lecture material. Each homework is worth 10 points, and your homework mark is the sum of the best 10. Each homework should not take more than 2 hours.

Practical Sessions (20%)

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. There will also be experimental work to develop skills in experimental technique and data analysis. The grade will depend on group quizzes (2%), notebook reports of group activities (8%) and two experiment-based formal lab reports (2% and 8%) written in collaboration with your assigned group.

Midterm Test #1 (10%)

The first test will be 1 hour long, scheduled during week 5 subject to room availability. It 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.

Midterm Test #2 (20%)

The first test will be 2 hours long, scheduled during week 10 subject to room availability. It 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 covered from weeks 5-9. The only aids allowed are a non-programmable calculator and a *hand-written*, double-sided, letter-sized aid sheet which you prepare individually beforehand.

Final Examination (36%)

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

Class Policies

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 and 9:10am on Wednesdays. Late arrival or early departure may affect your participation mark. If you must arrive late for unavoidable reasons, 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.

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 24 hours, possibly excepting weekends.

Absences

In order to ensure fairness and also 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 on the basis of 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 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 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

AccessAbility

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

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 in order to receive email notifications when new posts are available, and there are also options for posting anonymously.

Physics Centre

Held in SW503 outside the lab area, this centre is managed and run by the Environmental and Physical Sciences students' Association (EPSA) and the Department of Physical and Environmental Sciences (DPES). Selected outstanding volunteer students will be available to offer help with Physics questions and problems. The schedule will be posted at <http://www.myepsa.ca/tutoring/physics-centre/>

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. They should not necessarily be viewed as a full transcript of what was discussed.

Class Schedule:

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 room availability 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.

Dates	Tuesday Lecture 15:00-17:00	Wednesday Lecture 9:00-10:00
Jan 08,09	Introduction Position and Velocity Ch.1: 1-4, 8	Acceleration Ch.1: 5-8
Jan 15,16	1D Kinematics Ch.2 1-5	1D Kinematics Ch.2: 6-7
Jan 22, 23	Vectors and Coordinates Ch.3: 1-4 2D Kinematics Ch.4: 1-2	2D Kinematics Ch.4: 3
Jan 29,30	2D Kinematics Ch.4: 4-6	Newton and Forces Ch.5: 1, 4-6
Feb 05, 06	Newton and Forces Ch. 5: 2-3,7 1D Dynamics Ch.6: 1-6	Newton's 3 rd Law Ch. 7: 1-3
Feb 04-08 TBA	Test 1: Ch. 1-5	
Feb 12, 13	Newton's 3 rd Law Ch.7: 4-5 2D Dynamics Ch. 8 1-3	2D Dynamics Ch. 8: 4-5
Feb 18-22	Reading Week	
Feb 26, 27	Work and Kinetic Energy Ch. 9: 1-6 Potential Energy Ch.10: 1-3	Energy Conservation Ch.10: 1-3
Mar 05, 06	Impulse and Momentum, Momentum Conservation Ch.11: 1-2	Collisions and Explosions Ch.11: 3-6
Mar 12, 13	Rotation, Torque, Rotational Dynamics Ch. 12: 1-2, 4-6	Rotational Energy, Angular Momentum Ch. 12: 3, 7-12
Mar 19, 20	Simple Harmonic Motion Ch.15: 1-5	The Pendulum Ch.15: 6
Mar 16-22 TBA	Test 2: Ch. 1-12	
Mar 26, 27	1D Waves Ch. 16: 1-3 Sound and Light Ch.16: 4-5	Intensity, the Doppler Effect Ch.16: 7-9
Apr 02, 03	Standing Waves Ch.17: 1-4 Wave Interference Ch.17: 5-7	Beats Ch.17: 8
Apr 10-27 TBA	Final Exam	