

2022 Course Syllabus for
PHY151F
Foundation of Physics I
Last updated: September 7, 2022

ACKNOWLEDGEMENT OF TRADITIONAL LANDS

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

CONTACT INFORMATION

Lectures: Prof. Brian Wilson (Physics Teaching Group)
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Course Administrator: Ms. April Seeley
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COURSE DESCRIPTION

The first physics course in many of the Specialist and Major Programs in Physical Sciences. It provides an introduction to the concepts, approaches and tools the physicist uses to describe the physical world while laying the foundation for classical and modern mechanics. Topics include: mathematics of physics, energy, momentum, conservation laws, kinematics, dynamics, and special relativity.

Prerequisite: MCV4U Calculus & Vectors / MCB4U Functions & Calculus; SPH4U Physics

Corequisite: MAT137Y1/MAT157Y1

Exclusion: PHY131H1

The focus in PHY151F is on mathematical tools in physics. The class aims to get you interested in physics and to provide the foundation of your education in physical sciences, whatever your eventual program of study.

By the end of the course, you should be able to:

- Use the following mathematical tools to solve physics problems: vectors, derivatives, integrals, multiple coordinate systems, moving reference frames, conservation laws.
- Identify and apply assumptions and approximations in order to reduce a complex, real-world situation into a solvable physics problem.
- Take measurements (with uncertainties) of a real system and use those data to determine

quantities which are not directly measured, and to judge whether the data are consistent with a given theory or model.

COURSE MATERIAL

Physics for Scientists and Engineers (5th edition) by Randall D. Knight. This isn't strictly necessary, but is likely useful.

Mastering Physics online account. **Purchase it at the UofT Bookstore!** If you buy it anywhere else it almost certainly will not work. This is probably more important than the textbook itself.

A scientific calculator with no wireless communication capability. It may not have graphing functions or the ability to do derivatives or integrals. Useful for the tests and exam.

A smartphone, tablet, or laptop with wifi access will be helpful for classes.

ASSESSMENT

FINAL EXAM:	35%
3 TERM TESTS:	30%
PRACTICALS:	15%
PARTICIPATION:	12%
WRITTEN HOMEWORK:	8%
BONUS PRE/POST-COURSE DIAGNOSTIC QUIZZES:	1%

Note that with the bonus mark, the maximum possible grade is 101%. Since the system does not allow grades higher than 100%, any such grades will be rounded down to 100%.

I will round some marks up to the next GPA step, for example a 79% will get rounded up to an 80%. How generous this rounding is will depend on what fraction of the class fills in the online course evaluations near the end of the semester. More details will be communicated in November. Note that these are anonymous and instructors don't get to see them until about a month after all the final grades are submitted.

CLASSES

Classes will be in room ES1050 on Mondays, Wednesdays and Fridays starting at 1:10 pm. Classes will be structured assuming that you have watched the pre-class videos before coming to lecture.

A significant portion of class time will involve students working in groups. Please come to class prepared to participate. You should bring something to write/sketch with. I recommend a pencil and notebook because physically writing on paper happens to facilitate learning much better than typing the same content into a computer. A stylus with a tablet works well too.

Class notes, slides, and recordings will be posted on Quercus. It will help your learning if you take your own notes anyway. Paraphrasing what others have said is one form of active listening, and active learning improves learning.

Please note that the classes will be recorded! If you do not wish to be recorded, please do not sit at the front of the class.

Please respect others, including the professor, in the classroom. Turn your cell phones to silent mode. Do not play video games or watch TV shows unless you're in the back row where you will not distract others.

PRACTICALS

The goals of the Practicals are to help you develop skills to:

- Manipulate equipment and instrumentation
- Record and calculate measurements and uncertainties (\pm)
- Use computers, and the Python programming language in particular, to analyze data and solve problems
- Work effectively in a team
- Succeed on the problem sets, term tests and final exam

Attendance during Practicals is a mandatory part of the course and will be monitored by your TAs. Each Practicals group has two graduate student Teaching Assistant instructors (TAs), and up to 32 students. The first Practicals session will be during the week of Sep. 20-23, and you will meet weekly after that. You will be assigned a seat at a table with three other students.

Practicals activities completed during the Practicals times will be marked and returned to you the following week. There are 10 Practicals sessions throughout the semester, and your Practicals mark will be based on your best 9 out of 10 Practicals scores.

- Prof. Jason Harlow is the Practicals Coordinator and is the person to contact regarding questions about the Practicals.
- Ms. April Seeley handles issues about scheduling, enrolling in different practical sections and other administrative matters.

If, due to illness or a family emergency, academic conflict, etc., you miss a Practical, please declare your absence on ACORN (Profile & Settings \rightarrow Absence Declaration) and save the pdf confirmation to your computer. Then contact April Seeley at april.seeley@utoronto.ca to notify us of your absence. The missed Practical will be excused, and not counted in your Practicals mark, which will be based on the non-excused Practicals.

OFFICE HOURS

Wednesdays, 10:30 to 11:30 AM in MP125B

Thursdays, 10:30 to 11:30 AM on Zoom: <https://utoronto.zoom.us/j/85976179149>

Meeting ID: 859 7617 9149

Passcode: Physics

If you cannot make the official office hours, it may be possible to schedule occasional office hours at different times. Please set up an appointment via e-mail, and expect it to take a few days (so don't wait until the day before a test to try to visit).

E-MAIL

For most questions, please use the Discussion Board on Piazza (there's a link to it on Quercus). For one thing, another student might answer you more quickly than I can.

Medical and other personal issues should be done via e-mail. If I do not reply within two working day, you should send me a reminder e-mail as my in-box can get rather full.

I don't typically check my email on weekends or holidays.

TESTS AND EXAM

The Term tests will be held during class time at the Exam Centre (so not in our regular class). They will each be 45 minutes long, and they will start promptly at 1:10 pm. The tests will be held on:

- Friday, October 7, 2022
- Friday, October 28, 2022
- Friday, November 25, 2022

The final exam will be scheduled by the university at some point in the future (hopefully October). It will be 3 hours.

There are no make-up tests. If you miss one test for a valid reason (health, emergencies) then your other two term tests will be worth 15% each. If you miss two tests, your remaining term test will be worth 20% and your exam will be worth 45%. If you miss all three term tests we will need to discuss your options.

The term tests 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.

All tests and exams are cumulative.

You will be allowed to bring a single 8.5 by 11 page (or A4), double sided, and hand-written (no photocopies) for the tests and exams. This aid sheet can have whatever you wish. **The same size restrictions apply for the exam - ONE SHEET ONLY.** You can bring a paper (non-electronic) translation dictionary if you wish (i.e. Chinese-English).

HOMEWORK

There will be four written assignments with the following due dates (Sundays):

Sep 25, Oct 16, Nov 6, Nov 27.

You must write out your solution, with all logic, and upload it to Quercus. It will be graded based on your logic, not just whether you got the final answer correct. That means you can get the correct answer but not get a perfect grade.

Homework assignments have a **late penalty of 10% per calendar day** (not business day) for up to 3 days. After that the mark will be zero.

PARTICIPATION

In order to learn, one must practise. Doing homework and participating in class are both good ways to practise. In order to encourage you to do your homework and come to class, there will be participation grades.

There will be two sets of online homework questions assigned most weeks on Mastering Physics. You can only get credit for doing one of them. The harder assignment will have fewer questions and can be done more quickly, while the easier assignment will have more questions and will take longer to complete. You are encouraged to try the harder one first. If you find it too challenging you should switch to the easier assignment. You can try the harder one later if you like. You will get the higher of the two marks from each pair of homework assignments.

During class, there will be breaks to answer questions using the Team Up app through Quercus. You will need a computer, tablet or smartphone with internet access to use the app.

When we finish each chapter, there will be a ‘quiz’ on Quercus asking you to reflect on what you have, and have not, learned for that chapter.

Your participation grade P will be calculated by

$$P = 8(X + Y + Z)$$

where X is your fraction (percentage) of all possible Mastering Physics marks earned, Y is your fraction of all possible Team Up marks earned, and Z is your fraction of all possible reflection marks earned. Note that your score has a maximum possible value of 24, but all participation grades are capped at 12. This is intentional; you do not need to commit to 100% participation in the course in order to get all of the participation grade. Life happens.

These grades are not free. You do need to get answers correct to get credit. These grades are relatively easy to get compared with the other grades in the course.

Note that these grades don’t have a late penalty. If you do not do them by the deadline you get zero credit. Exceptions will be made for illnesses, emergencies, and similar issues. If in doubt, ask for consideration.

PRE/POST-COURSE DIAGNOSTIC QUIZZES

There will be an online set of surveys. We will ask you to fill them in honestly at the start of the semester and again at the end of the semester. If you finish all the surveys, you will get a bonus 1% mark for the course. This is independent of what anyone else in the class does. To earn this mark, all you have to do is to answer all questions on the quizzes, regardless of the correctness of your answers. We only ask that you avoid guessing; your answers should reflect what you personally think.

The purpose of these surveys is so we can measure how effective our teaching in this course is. When we try new teaching techniques, based on the latest research in pedagogy, we want to know if it is effective. Your answers to these surveys help us determine what works, and what we should stop doing.

CONCERNS?

If you have any concerns about the course and your ability to do well, please come see me and we can discuss your situation. I am happy to make reasonable accommodations to ensure that all students have an equal opportunity to do well in this course.

ACADEMIC INTEGRITY

Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. Familiarize yourself with the University of Torontos Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>). It is the rule book for academic behaviour at the U of T, and you are expected to know the rules.

As a quick guideline: if you figure out a trick which lets you get marks without doing as much work as everyone else, this is probably academic fraud and if you are caught you may be sanctioned.

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact me. If you are experiencing personal challenges that are having an impact on your academic work, please speak to me or seek the advice of your college registrar.

Tests and Exam: The tests and final exam must be done individually, involving no communication at all with your peers. It is strongly advised not to engage in any behaviour that might be construed by the invigilators for the tests/exam as an attempt to obtain information from another candidate or from another test/exam paper.

Practicals: The work graded for marks during Practical's must be completed during Practical's with the other members of your pod. Materials completed before Practical's may not be brought in and used to speed up the work in Practical's. Each pod-member should try to contribute, and encourage others to contribute to the work that ends up being submitted. All members of the same pod who are in attendance share the mark of the single submitted product. One of the purposes of Practical's is to teach you how to form effective teams, and work efficiently within a team of three or four peers.

Written Homework: You can talk with other students while working on the homework. However, the entirety of your submission must be your own work. You may not copy anyone including other students or internet sources.

Participation: Class participation is meant to be done in groups. Please collaborate. The Mastering Physics homework is meant to be an individual effort, but you can certainly ask people for help as long as you do the work yourself and understand the answers. Both of these tools are meant to help you prepare for the tests and exam, so cheating on the participation grades will ultimately lower your mark in the course.

MENTAL HEALTH AND WELLNESS

As a university student, you may experience a range of health and/or mental health issues that may result in significant barriers to achieving your personal and academic goals. The University of Toronto offers a wide range of free and confidential services and programs that may be able to assist you. We encourage you to seek out these resources early and often. Student Life Website: <http://www.studentlife.utoronto.ca> Health and Wellness Website: <http://studentlife.utoronto.ca/hwc> If, at some point during the year, you find yourself feeling distressed and in need of more immediate support, visit the Feeling Distressed Webpage: <http://www.studentlife.utoronto.ca/feeling-distressed> for more campus resources. Off campus, immediate help is available 24/7 through Good2Talk, a post-secondary student helpline at 1-866- 925-5454. Finally, almost every student experiences stress and/or anxiety at some point, commonly before tests and exams. Unfortunately, being stressed and/or anxious can make it more difficult to perform well on a test. Fortunately, your brain is part of your body, so doing something which relaxes your body will also help relax your brain, improving test performance. Again, the student life website can be helpful. One resource can be found at: <https://www.studentlife.utoronto.ca/mf/yoga>

ACCOMMODATIONS

If you have a learning need requiring an accommodation the University of Toronto recommends that students immediately register at Accessibility Services at <http://www.studentlife.utoronto.ca/as>.

Location: 4th floor of 455 Spadina Avenue, Suite 400 Phone: 416-978-8060

Email: accessibility.services@utoronto.ca

The University of Toronto supports accommodations of students with special learning needs, which may be associated with learning disabilities, mobility impairments, functional/fine motor disabilities, acquired brain injuries, blindness and low vision, chronic health conditions, addictions, deafness and hearing loss, psychiatric disabilities, communication disorders and/or temporary disabilities, such as fractures and severe sprains, recovery from an operation, serious infections or pregnancy complications.

As the instructor of this course, you are also invited to communicate with me at any time about your learning needs. Confidentiality of learning needs is respectfully and strictly maintained.

EQUITY, DIVERSITY AND INCLUSION

(This is from <http://equity.hrandequity.utoronto.ca/>.)

At the University of Toronto, we strive to be an equitable and inclusive community, rich with diversity, protecting the human rights of all persons, and based upon understanding and mutual respect for the dignity and worth of every person. We seek to ensure to the greatest extent possible that all students enjoy the opportunity to participate as they see fit in the full range of activities that the University offers, and to achieve their full potential as members of the University community.

Our support for equity is grounded in an institution-wide commitment to achieving a working, teaching, and learning environment that is free of discrimination and harassment as defined in the Ontario Human Rights Code. In striving to become an equitable community, we will also work to eliminate, reduce or mitigate the adverse effects of any barriers to full participation in University life that we find, including physical, environmental, attitudinal, communication or

technological.

Our teaching, scholarship and other activities take place in the context of a highly diverse society. Reflecting this diversity in our own community is uniquely valuable to the University as it contributes to the diversification of ideas and perspectives and thereby enriches our scholarship, teaching and other activities. We will proactively seek to increase diversity among our community members, and it is our aim to have a student body and teaching and administrative staffs that mirror the diversity of the pool of potential qualified applicants for those positions.

We believe that excellence flourishes in an environment that embraces the broadest range of people, that helps them to achieve their full potential, that facilitates the free expression of their diverse perspectives through respectful discourse, and in which high standards are maintained for students and staff alike. An equitable and inclusive learning environment creates the conditions for our student body to maximize their creativity and their contributions, thereby supporting excellence in all dimensions of the institution.