Physics II for the Physical Sciences
PHY A21 - Summer 2022

Tuesday 10-12 am SW 143
Thursday 10-11 SW 143

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Office hours Tuesday 12:30 to 2 PM
Thursday 11:30 to 2 PM

What is Light?

Our first answer to this question will come from our studies of Waves and Electromagnetism. Further queries on the nature of light will take us into Special Relativity. By the end of the term, we will be ready for follow-up courses in Quantum Mechanics where various questions regarding light and associated phenomena will lead us into the fields of atomic and nuclear physics.

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

- Identify and define the basic vocabulary used in the study of Wave motion and related phenomena, Electricity and Magnetism, and Special Relativity.
- Use techniques of analytical and numerical problem solving that go beyond "plug-in-the-formula".
- Interpret and give examples of the physical laws governing electric and magnetic interactions, electromagnetic waves, and relativistic phenomena.
- Recognize the important change in paradigm that led to the development Special Relativity and the beginning of what is known as Modern Physics.
- Using mathematics as the basic scientific language, employ techniques of single-variable calculus to model, simplify, and solve physical problems.
- Employ individual and group problem-solving skills to the analysis of physical systems, in the form of experiments, conceptual and phenomenological questions, and multi-concept detailed problems.
- Recognize the existence of a basic model for the study of Physics, and translate this model into tools and learning skills useful in other disciplines.

- Develop strategies to implement the acquired organization, study, and discipline skills learned in the course to future academic and professional areas.

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Course Requisites & Required Materials

Course Corequisite: Calculus II (MATA35/36/37)
Course Pre-requisites: Introduction to Physics IA (PHYA10), Calculus I (MATA30/31)

- **Textbook**: *Fundamentals of Physics* by Halliday, Resnick, & Walker (Wiley, 11th Ed.)

The schedule provided at the end of this document indicates the readings you must complete **before** each lecture. The reading quizzes and in-class participation will be based on these assigned readings.

Your first time reading the assigned material does not need to be highly detailed. Focus on the main concepts, read one or two examples, and browse quickly thorough any derivations. This first reading will be the assumed starting point for all lectures. Therefore, failing to complete the readings and associated reading quizzes will impair your ability to understand our lecture discussions.

The textbook also provides the conceptual questions and detailed problems that will be the subject of the weekly online homework, practical activities, and group quizzes. To complete the online homework you will need a registration code for **WileyPLUS**, available at the UofT Bookstore, either as an access card bundled with the textbook or as a digital-only resource. Once you have a registration code, follow any WileyPLUS link on the course website to complete your registration.

- **Calculator:**

Casio: FX-260, FX-300*
Texas Instruments: TI-30X IIS, TI-30XS
Sharp: EL-520*, EL-531*, EL-W535*

For the course, any scientific and non-programmable calculator will be required. The models listed above are some of those available at the bookstore that satisfy the course requirements. The asterisk "*" indicates that any sub-model within that specific model designation is also accepted.

Grading scheme

Component	%	Due Date
Online Homework	10	Ongoing (Weekly)
Practical Activities	10	Ongoing (Weekly Practical)
Practical Quizzes	5	Pre-Practical
Formal Lab Reports	10	Week 8 & 12
Test 1	10	Week 6 (Tentative)
Test 2	20	Week 10 (Tentative)
Final Exam	35	Exam Period (August 14 -27)

Online Homework (10%)
Deployed through the WileyPLUS system, these assignments will be a weekly set of questions based on the textbook reading material and lecture discussions of the week just ending. Each homework is worth 10 points, and your final grade is the average of the best 10 results. A mix of conceptual questions and applied problem-solving exercises will be included. Do not spend more than two hours on each homework.

Practical Quizzes (5%)
Bi-weekly quizzes will be conducted on the start of your practical session. The quiz starts at your practical and finishes by 20 minutes passed the session. Each quiz is worth 1 % toward your final grade. The quizzes contains only one question aiming to review the course material from the past two week.

Practical Sessions (20%)
Beside Bi-weekly quizzes, in these three-hour weekly sessions, you will work in groups to discuss examples on the concepts introduced in your textbook readings and lecture presentations. Groups will apply these concepts and principles, to develop skills useful in scientific conceptual analysis and general problem solving.
Further work will focus on the development of experimental techniques related to Physics and the Scientific Method. notebook-recorded group activities contribute 10 % of the final grade, and two experiment-based formal lab reports (1% and 9%) written in collaboration with your assigned group.

Attendance to the practicals is **mandatory** and a deduction to your final practical grade will be applied should you miss a session. More information will be provided during your first practical session (second week of classes) and on the course website.

Test 1 (10%)
The first test will be scheduled tentatively during Week 6 and it will be 1 hour long. This test will feature the material from the lectures and textbook readings up to and including the discussions of Week 5. The questions will also be based on the practical activities and online homework up to and including material due on Week 5. The format includes only multiple choice questions. The only aids allowed are your non-programmable scientific calculator, and a hand-written, double-sided, and letter-sized aid sheet. Photocopies or computer printouts are not allowed.

Test 2 (20%)
The second test will be scheduled tentatively during Week 10 and it will be 2 hours long. This test will feature the material from the lectures and textbook readings up to and including the discussions of Week 9. The questions and problems will also be based on the practical activities and online homework up to and including material due on Week 9. The format includes multiple-choice questions as well as detailed problems. The only aids allowed are your non-programmable scientific calculator, and a hand-written, double-sided, and letter-sized aid sheet. Photocopies or computer printouts are not allowed.

Final Examination (35%)
The final examination will be scheduled during the exam period of August 14- August 27. Material for the final examination will include all the topics discussed in the assigned textbook readings, lecture presentations, online homework, and practical sessions. The final examination will be 3 hours long and the format includes multiple-choice questions as well as detailed problems. The only aids allowed are your non-programmable scientific calculator, and a hand-written, double-sided, and letter-sized aid sheet. Photocopies or computer printouts are not allowed.

Name and Student Number
Any work you hand in must clearly indicate your name and student number, this includes practical activities, formal reports, tests, and the final exam. If we are unable to identify the work as yours, a grade of zero will be awarded.

In-class Conduct
- Class starts at 10:10 am, and ends at 12:00 am on Tuesday and 11:00 am on Thursday. Late arrival or early departure from class is inappropriate and will be distracting for your classmate.
- Regarding anything that you want to use in the classroom: if you are not using it to perform a task specifically related to what we are doing in class at that very moment, you must put it away. This includes but is not limited to cell phones, laptop computers, tablets, and other electronic devices.
- Do not bring food into the classroom as this creates unwanted distractions that will negatively affect the learning environment. Be considerate to your peers.

e-mail
If you want to ask a question via email, please first check the various threads in the Discussions section 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 email. This way you will also help other students facing the same issue. These discussions 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 these electronic forums are not the best place for your query, make sure you send your email from an official utoronto.ca address (e.g., your UTmail+ account), as all other addresses will be filtered out automatically. For a quicker response time include the code PHYA21 in the subject line of your message.

Absences

In order to ensure fairness in the assessment of all students, there will be no makeup options for practical activities, formal reports, or the tests. In the case of a valid and documented problem that supports an absence to 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 to 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 to 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 here on the Registrar's Website.

Academic Integrity and Respect for the Academic Endeavor

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:*
https://governingcouncil.utoronto.ca/media/15068/view
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. 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.utsc.utoronto.ca/vpdean/academic-integrity).

Class Schedule

This schedule is tentative and might change during the term in order to accommodate for variations in the lecture discussions in response to student performance and understanding of the various topics. Please note that it is your responsibility to read the assigned sections and chapters before each lecture.
The lecture discussions will not be a direct repetition of the basic material found in the textbook. Failing to complete the readings before each lecture will hinder your ability to understand the class discussions, as a minimum understanding of the basic concepts from the assigned readings will be assumed as the starting point for all lecture discussions.

Week	Tuesday 10-12 am	Thursday 10-11 am
May 10 May 12	Wave Speed Ch.16: 1 - 2 Jan. 09 Wave Interference Ch.16: 5	Standing Waves Ch.16: 7
May 17 May 19	Sound Waves Ch.17: 1 - 3 Intensity & Instruments Ch.17: 4 - 5	Beats & Doppler Effect Ch.17: 6 - 7
May 24 May 26	Electric Charge & Force Ch.21: 1 - 3 The Field Model Ch.22: 1	Field of Point Charges Ch.22: 2 - 3
May 31 June 2	Continuous Distributions Ch.22: 4 - 5 Motion in Electric Fields Ch.22: 6 - 7	Electric Potential Ch.24: 1 - 2
June 7 June 9	Potential of Point Charges Ch.24: 3 - 4 Continuous Distributions Ch.24: 5	Potential, Field & Energy Ch.24: 6 - 8
June 14 June 16	Capacitance & Dielectrics Ch.25: 1 - 5 Current Ch.26: 1 – 2, Resistance & Ohm's Law Ch.26: 3 - 5	**First Term Test**
Reading Week	---	---
June 28 July 5	Circuit Laws Ch.27: 1 Resistor Circuits Ch.27: 2 - 3	RC Circuits Ch.27: 4
July 7 July 12	Magnetism Ch.28: 1 - 3 Magnetic Forces Ch.28: 4 - 8	Magnetism & Currents Ch.29: 1 - 5
July 14 July 19	Lenz & Faraday Ch.30: 1 - 2 Induced Fields Ch.30: 3 - 4	Electromagnetic Waves Ch.33: 1
July 21 July 26 **	Interference of Light Ch.35: 1 - 3 Diffraction Ch.36: 1 - 3	Simultaneity & Time Ch.37: 1
July 28 August 2	Time & Length Ch.37: 1 - 2 Lorentz Transformations Ch.37: 3	Addition of Velocities Ch.37: 4
August 4 August 9	Doppler for Light Ch.37: Relativistic Momentum Ch.37: 6	5 Relativistic Energy Ch.37: 6

** Second Term test will be held on week 10 tentatively, The time and the place is TBD.

- **This syllabus primarily is prepared by Professor Johann Bayer and has been adjusted for purpose of the course PHY A21 Summer 2022**