PHYA21H3- Winter 2024

Physics II for the Physical Sciences

““Spacetime tells matter how to move; matter tells spacetime how to curve.” – John Archibald Wheeler”

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Office Hours: Tuesday 11:00-12:00, Thursday 12:00 -13:00

Course website: on Quercus  https://www.utsc.utoronto.ca/projects/quercus/

Lectures & Practicals are in person, and office hours will be held weekly.

Course Description:

This course is required 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 wave motion (Both Longitudinal and Transverse Wave), Electricity & Magnetism and The Special Theory of Relativity. 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: Introduction to Physics IA (PHYA10), Calculus I (MATA30/31)

Corequisite: Calculus II (MATA35/36/37)

Required materials:

Textbook: University Physics with Modern Physics, 3rd ed, by Wolfgang Bauer & Gary Westfall McGraw-Hill. Students who are familiar with other textbooks such as Fundamentals of Physics by Halliday, Resnick, & Walker (Wiley, 12th Ed.), or the textbook Physics for Scientists and Engineers by Randall D. Knight (Pearson, 4th ed.) still can use them, however, Assignments will follow the book University Physics with Modern Physics using CONNECT. The chapters’ numbers listed in the Tentative Schedule Winter-2023 section below corresponds to this textbook, which can easily be matched to the books mentioned above.

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical Activities</td>
<td>12</td>
<td>Weekly (practical sessions)</td>
</tr>
<tr>
<td>Quizzes</td>
<td>04</td>
<td>In Practicals, ideally the week before Tests.</td>
</tr>
<tr>
<td>Formal Lab Reports</td>
<td>06</td>
<td>Week 4 &amp; 8 (tentative)</td>
</tr>
<tr>
<td>Midterm Test 1</td>
<td>10</td>
<td>Possibly Week 5 TBA by Registrar office</td>
</tr>
<tr>
<td>Midterm Test 2</td>
<td>18</td>
<td>Possibly Week 10 TBA by Registrar office</td>
</tr>
<tr>
<td>Assignments</td>
<td>04</td>
<td>Check Connect for due dates</td>
</tr>
<tr>
<td>Final Examination</td>
<td>46</td>
<td>Exam Period April (Registrar decision)</td>
</tr>
</tbody>
</table>

Assignments (4%)

You are encouraged to do the assigned problems from the end chapters in the textbook, which you will find on Connect. 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 from the textbook 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 Assignment after reading the lecture notes & the textbook. This will help you mastering problem solving & for better understanding of the physical concepts.

Practical Sessions (22%)

In these 3-hour weekly sessions you will work in groups (ideally of 3 students) to discuss examples based on the concepts introduced in the lecture and textbook readings. **You are expected to attend all these sessions missing five of practical sessions you will be assigned a zero/21 for the practical grade.** There might be experimental work from “Connect” (Video & data files will be provided if necessary) to develop skills in experimental technique and data analysis. The total practical grade has the following components: quizzes (4%), practical group activities (12%) and grade for two experiment-based formal lab reports. The **first report (worth 1%)** is written **in collaboration** with your assigned group. The second report (**worth 5%**) is **individually written sharing the Data with the group**. You should submit **hard copy** of your reports **at the beginning of the practical on the due date**. 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%, respectively)

The two tests will be for 1.5 hour long each, scheduled by the Registrar office. Test-1 will cover material discussed in lecture, readings, and practical sessions possibly up to material covered in the previous week. The only aids allowed are a non-programmable calculator and a
hand-written, one-side, letter-sized aid sheet which you prepare individually beforehand. It includes maximum of 20 equations with no solved problems, graphs, or explanation for test#1. You will need to submit the used formula sheet with your tests & Exam papers. Do not include numerical values for the universal constants as those will be provided. 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, one-sided, letter-sized aid sheet which you prepare individually beforehand, which includes maximum of 30 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 (45%)

The final examination will be scheduled during the exam period in April and will cover material from the entire course. It will be cumulative for 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, which includes maximum of 40 equations with no solved problems, graphs, or explanation. Do not include constants as those are given.

Course Policies

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. Please include the course code PHYA21 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 or DPES 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 services*

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 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. Students who have been newly admitted to the University of Toronto Scarborough (UTSC) and require accommodations, should register with AccessAbility Services as soon as the Letter of Offer is accepted. The UTSC accessibility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations, please use this link https://www.utsc.utoronto.ca/ability/welcome-accessability-services to contact them.

**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 Videos & Lecture Notes**

Lectures will be recorded and will be posted after the lecture by the CTL staff. Slides from the lectures will be made available on the course website after each lecture. These notes are usually not drawn from the textbook; they are intended to guide you by introducing the main concepts & help with problem solving. The lecture notes 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. When found necessary, supplementary notes will be provided as well.
**In class conduct:**

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

- Class starts at 9:10am on Tuesdays & 11:10am on 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.
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 and Exam.

Week-1 -- Chapter 15: Waves (sec. 15.1 to 15.8)
Week-2 -- Chapter-16: Sound (Sec. 16.1 to Sec. 16.4)
Week-3 -- Chapter-21: Electrostatics (Sec. 21.1 to Sec. 21.6)
Week-4 -- Chapter-22: Electric Field & Gausses Law: (Sec. 22.1 to Sec. 22.8)
Week-5 -- Chapter-23: Electric Potential (Sec. 23.1 to Sec. 23.5)
Week-6 -- Chapter-24 Capacitors (Sec. 24.1 to Sec. 14.5)
Week-7 & 8-- Chapter-25 & 26: Resistance & Circuits (25.1 to 25.7 & 26.1 to 26.4)
Week-9 -- Chapter-27: Magnetic force & Magnetic Field (Sec. 27.1 to 27.6)
Week 10 – Chapter-34: Wave Optics (Sec. 34.1 to Sec. 34.3)
Week-11 to 13 -- Chapter-35: Relativity (Sec. 35.1 to Sec. 35.4)