

WAVES, ELECTRICITY AND MAGNETISM WINTER 2023

PHYS 122

Published Jan 09, 2023

CLASS SCHEDULE

Section	Location	Time	Instructor(s)
PHYS 122 001 [LEC]	DC 1351	Tuesdays & Thursdays 10 a.m. - 11:20 a.m.	Karen Cummings karenc@uwaterloo.ca
PHYS 122 002 [LEC]	AL 116	Mondays & Wednesdays 8:30 a.m. - 9:50 a.m.	
This table is generated automatically			

INSTRUCTOR / TA INFORMATION

Name	Role	Contact Info
Karen Cummings	Instructor	karenc@uwaterloo.ca
Learn Help	Help with LEARN and TEAMS	learnhelp@uwaterloo.ca
MasteringPhysics Help	Help with Mastering and e-texts	https://support.pearson.com/getsupport/s/

e-mail messages are read regularly and directed to the appropriate person for follow-up. Typically, someone (TA or instructor) will reply within 2 business days. Feel free to follow-up if you have not heard back from anyone within 4 business days.

In-person office hours:

Professor Cummings will be available immediately after our class for briefer discussions that can be held in our classroom or just outside the room in the hall. She will be available for sit-down meetings on Tuesdays and Thursdays 1-2 pm in PHYSICS 371. She is also available at some any other time by appointment. Send email with a suggested day and time to arrange a meeting.

TA Contacts

More information regarding who to contact for what kind of help will be posted on the course webpage.

Khushmeet	Dhaliwal	k8dhaliw@uwaterloo.ca (mailto:k8dhaliw@uwaterloo.ca)
Zhiyu	Jin	z83jin@uwaterloo.ca

Sanchit	Srivastava	s49sriva@uwaterloo.ca
Adrian	Lopez	a22lopez@uwaterloo.ca
Matt	Piatt	mpiatt@uwaterloo.ca
(0.5) Justin	Marchioni	jmarchio@uwaterloo.ca (mailto:jmarchio@uwaterloo.ca)
(0.5) Esha	Swaroop	eswaroop@uwaterloo.ca (mailto:eswaroop@uwaterloo.ca)

COURSE DESCRIPTION

Calendar Description for PHYS 122

Simple harmonic motion, resonance, damped harmonic motion, complex numbers, wave motion and sound, electrostatic force and potential, electric current and power, capacitors, DC circuits, LRC circuits, introduction to magnetic fields Lorentz Force. [Offered: W, S; also offered online: S]

Prereq: One of PHYS 111 (minimum grade 70%), 115, 121, ECE 105. Coreq: One of MATH 127, 137, 147. Antireq: PHYS 112, 125

Overview

This course will be taught as six two-week modules covering oscillations, waves, electricity and magnetism. See the schedule below for more details. Students will practice problem solving using an on-line homework system called MasteringPhysics which is available from the commercial publisher, Pearson. These assignments are due every two weeks. There will be midterm exam and final exam, both held in person. There are two grading schemes in this course. In one grading scheme, all the course credit comes from just these three sources (Mastering, Midterm and Final). If a student prefers, they can shift some credit away from exams. In the alternative grading scheme we value participation in tutorials and lecture attendance. Students work in groups during tutorial sessions once each week. Tutorial work is evaluated in two ways: TA "check-outs" and submission of an individual learning artifact. Clickers are used in every class to monitor attendance and increase participation. Peer-graded quizzes will be given during lecture sessions to provide students an opportunity to evaluate their understanding prior to the midterm and final exams but don't count for credit.

LEARNING OUTCOMES

By the end of this course students should be able to:

Identify and correctly apply concepts related to oscillations and waves including sound.
Identify and correctly apply concepts related to electrostatics and magnetism.
Apply appropriate mathematics in solving problems involving oscillations, waves, electrostatics and magnetism.
Work effectively and collaboratively in diverse groups.

TENTATIVE COURSE SCHEDULE

Module # week #s	Topic(s)	Dates:	Chapter in University Physics
Module 1 Week 1 & 2	<p>1. Mathematical review: derivatives and integrals of polynomials and trigonometric functions, dot- and cross-products, solving multiple equations with multiple unknowns.</p> <p>2. Mathematical and physical representations of simple harmonic motion including damping, resonance, and energy considerations- with examples from springs and pendula. Using complex exponentials to represent sine and cosine.</p> <p>Mastering Due: Sunday, Jan. 22 at midnight.</p>	Jan. 9-22	Math Review Chapter 14
Module 2 Week 3&4	<p>3. Mathematical and physical representations of waves, wave speed and energy considerations, waves on strings, normal modes.</p> <p>4. Sound, interference, doppler shifting.</p> <p>Mastering Due: Sunday, Feb. 5 at midnight.</p>	Jan. 23-Feb. 5	Chapters 15 and 16
Module 3 Week 5&6	<p>5. Charge, electrostatic force, electric fields, electric dipoles.</p> <p>6. Electric flux, Gauss's law, the nature of charge on conductors.</p> <p>Mastering Due: Sunday, Feb. 19 at midnight. Due to Reading Week, you can submit until Sunday, Feb. 26 at midnight without penalty.</p>	Feb. 6-19 Reading Week Feb. 18-26	Chapters 21 and 22
*****	Midterm Exam Covering Modules 1,2 and 3 is scheduled to be held in the evening on March 2 (in-person). Please let Prof. Cummings know immediately if you have a conflict. There are no make-up midterms. If you miss the exam, including with a valid excuse, the weight will be shifted to the final exam.	Evening of March 2	*****

Module 4	7. Electric potential and potential energy, equipotential surfaces, potential gradients.	Feb. 27- March 12	Chapters 23 and 24
Week 7&8	8. Capacitance, capacitors in series and parallel, energy and charge in capacitors, dielectrics.		
Mastering Due: Sunday, March 12 at midnight.			
Module 5	9. Current, voltage, emf, resistance and resistivity, conduction, energy and power in electric circuits.	March 13 -26	Chapters 25 and 26
Week 9&10	10. DC circuits, resistors in series and parallel, Kirchhoff's Laws, R-C circuits, electrical measurements and power distribution.		
Mastering Due: Sunday, March 26 at midnight.			
Module 6	11. Magnets, magnetic field, field lines, flux, moving charge in a magnetic field (Lorentz Force) , force on current-carrying wires, current loops, motors, Hall effect.	March 27- April 10	Selections from Chapters 27-30
Week 11&12	12. Magnetic field for moving charge, current element, current-carrying wire. Force between wires, Ampere's law, Induction, LCR oscillations.		
Mastering Due: Sunday, April 9 at midnight.			
No Tutorials on April 7. Those are rescheduled to Monday April 10.			
***** *	Final Exam will be cumulative and held during the final exam period as scheduled by the Registrar's Office	***** ***	

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
University Physics by Young and Freedman 15th Ed.	May purchase printed text or e-text. Previous editions or alternative texts are fine.	Yes
MasteringPhysics	On-line homework system.	Yes
Clicker or iclicker software	For participation credit	Yes

Please register for MasteringPhysics on the first day of class and get started on the first homework. If you paid for an e-text and/or MasteringPhysics last term, the code should carryover to both PHYS122 and PHYS124. You do not need to pay again.

If you did not purchase a code last term, there is a 14-day free trial period on MasteringPhysics. If need to purchase the materials and you are taking both PHYS122 and PHYS124 you only need to purchase an e-text and access code for MasteringPhysics once. The code and/or text will work in both courses. Just register fully in MasteringPhysics with your code for either course. When you then register for the second course (let's say PHYS 124) Mastering will not prompt you for a new access code as it will recognize that you have already purchased access and will automatically grant you Mastering access in the second course. The same goes for e-text access. You do not need to pay twice.

For more information on MasteringPhysics pricing and registration please see materials posted on LEARN.

STUDENT ASSESSMENT

Component	Value
	Grading Scheme A or Grading Scheme B
Participation	10% or 0%
Tutorial	15% or 0%
Mastering Physics	15% or 15%
Midterm Exam	20% or 30%
Final exam	40% or 55%

Additional Information

There are two grading schemes available to students. Scheme A gives credit for participation in the lecture portion of the course and tutorials. Scheme B shifts that weight to the midterm and final exam. We will automatically assign you the higher mark. You do not need to tell us which scheme you want to use.

Midterm Exam

The midterm will cover Modules 1,2 and 3 and is scheduled to be held on Thursday March 2 in the evening, in-person. Notify Prof. Cummings immediately if you know you have a conflict with the date. *We will NOT consider conflicts for those who provide us with less than 7 days notice.* If you get sick or have some other last minute emergency and miss the midterm with an accepted, valid excuse, then the weight will be shifted to the final exam.

Final Exam

This will be cumulative and is scheduled during the final exam period by the Registrar's Office. As per university policy, if you miss the final exam with a valid excuse, you must take the make-up during university make-up days which are held near the start of the next term.

Mastering Physics

There will be a MasteringPhysics assignment due for each Module (every two-weeks). The assignments will each contain about 25 required questions that should take approximately 4 hours to complete. In addition, there will be bonus questions that can be completed if desired. Answering these bonus questions can make-up for points missed elsewhere on the assignment, or can result in a score for MasteringPhysics that is greater than 100%. Scores over 100% “roll-over” into other Mastering Assignments, and even the other categories. No points for the required questions will be dropped. Assignments are due on the Sunday the week the Module ends, at midnight. Your score is reduced by 2% for every hour after this. You get 5 submissions (chances) for each question. **The first assignment is due on January 22.** See the course calendar above for additional dates.

Tutorials

Group Activities: You will meet in groups once per week on Wednesday or Friday. Group work will consist of various activities but often we will do either a conceptual tutorial or problem solving practice.

Group Structure: You will be placed into learning groups of 4 people which will be changed at midterm.

Learning Artifacts: After your tutorial you will submit a written record of your own work on the tutorial, or your notes from your group meeting, as a "learning artifact". **Artifacts are submitted through CrowdMark as soon as possible after your tutorial session but by Saturday night at midnight, at the latest.** You are not allowed to submit the work of a group member as part of your artifact. You only submit your own work and notes. If you miss a meeting you can still submit your own work as your artifact for credit.

TA Check-outs: *Students should not leave their group meeting without having seen a TA for (at least) attendance.* Group members who are absent receive a score of zero for the check-out. There are no make-ups.

Important Note Regarding TA check-out: For students who are present at the tutorial, these "check-outs" will be scored on a scale of 1,2,3,4 out of 4. **The default score will be a 3 out of 4 or 75%.** Most groups in PHYS122 will be quite good and will still get this score of 75%. Only the very best groups (top 10%) each session will get a 4 out of 4 or 100%. Groups who are not collaborating effectively will be reduced in score to a 2 or even a 1 in some cases. Please try to be collaborative and productive in your groups and don't expect a 100% in tutorial. The typical score for tutorial is about 83%.

Missed Work

If you have a VIF or 48-hour absence, we will drop up to two zeros for missed tutorials. In fairness to those students who do not get sick, we will drop the two lowest scores even if they are not missed work (zeros) due to illness. In other words, we drop two scores for everyone. A VIF is not required for this, and a VIF or 48-hour absence does not get you additional drops. If you have VIFs covering more than two missed tutorials, please contact Professor Cummings at the end of the term.

Participation

We will use clickers in every lecture class starting the second class. We use these devices to record attendance/participation and help you gauge your understanding. Once per week we will have peer-graded quizzes that will provide additional feedback on whether you understand core material. Your score on these quizzes will not impact your grade in the class except through your participation score. We will drop two missed classes for everyone, using the same policy discussed above for tutorial.

Academic Integrity: Your handwritten answers to all assignments, artifacts and tests must be your own work. Your answers will be scrutinized for comparison to answers that others have handed in and to what is available on the internet. The following policies will be employed:

- 1) Any work not handwritten will be rejected and given a grade of 0.
- 2) Any work handed in that is deemed to be too similar to anything we can find online will be flagged, the assignment given 0, and the student handing it in will be reported to the Dean's Office immediately, and possibly investigated under policy 71 (student discipline) of the University of Waterloo.
- 3) If any answers handed in appear to be too similar to work handed in by one or more other people, all such work will be flagged, all such assignments/tests given 0, and all students involved will be reported to the Dean's Office immediately, and possibly investigated under policy 71 (student discipline) of the University of Waterloo.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

Territorial Acknowledgement: The University of Waterloo acknowledges that much of our work takes place on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. Our main campus is situated on the Haldimand Tract, the land granted in a legally binding treaty to the Six Nations that includes six miles on each side of the Grand River. Our active work toward reconciliation takes place across our campuses through research, learning, teaching, and community building, and is centralized within our [Indigenous Initiatives Office](https://uwaterloo.ca/indigenous) (<https://uwaterloo.ca/indigenous>) .

UNIVERSITY POLICY

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70, Student Petitions and Grievances, Section 4](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) . When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check [the Office of Academic Integrity](https://uwaterloo.ca/academic-integrity/) (<https://uwaterloo.ca/academic-integrity/>) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) . For typical penalties, check [Guidelines for the Assessment of Penalties](https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) (<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>) .

Appeals: A decision made or penalty imposed under [Policy 70, Student Petitions and Grievances](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) (other than a petition) or [Policy 71, Student Discipline](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to [Policy 72, Student Appeals](https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72) (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>) .

Note for students with disabilities: [AccessAbility Services](https://uwaterloo.ca/accessability-services/) (<https://uwaterloo.ca/accessability-services/>) , located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.