



COURSE OUTLINE

1. **Course:** PHYS 323, Optics and Electromagnetism - Fall 2020

Lecture 01: MWF 16:00 - 16:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Timothy Friesen	timothy.friesen@ucalgary.ca	403 220-6123	SB 513	MF, 10:00 - 11:00

Online Delivery Details:

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

PHYS 323 will be largely delivered as a synchronous (live) lecture course. During each scheduled lecture a zoom room will be set-up (accessible through D2L) for the lecture. The lecture will be recorded and uploaded to D2L following each class.

Office hours will also be conducted online via Zoom.

The laboratory portion of this experiment will consist of six online labs. These labs will include individual at-home experiments as well as synchronous (live) group work components. Zoom will be used to connect during your scheduled lab session with your lab-mates and Teaching Assistants.

Instead of a midterm there will be three synchronous quizzes, each written during scheduled lecture time. There will be a synchronously written scheduled final (date and time TBA). The quizzes and final will be administered on D2L.

Course Site:

D2L: PHYS 323 L01-(Fall 2020)-Optics and Electromagnetism

Note: Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

Physics 223 and 3 units from Physics 211, 221 or 227; and 3 units from Mathematics 249, 265 or 275.

Antirequisite(s):

Credit for Physics 323 and any of 255, 259 or 355 will not be allowed.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %
Pre-reading assignments	10
Mastering Physics assignments	15
(At-home) laboratory experiments	25
Quizzes	25
Final Exam	25

Pre-reading assignments: A small pre-reading assignment will be due each Monday at 4 pm, starting Sept. 14th. These assignments will require you to read ahead and prepare for the lecture material to be presented in the coming week. These assignments will be delivered and submitted on D2L. The lowest mark pre-reading assignment will be dropped from your final grade for this component.

Mastering Physics assignments: We will use Pearson Mastering Physics system for additional assignments. Instructions for accessing the free or paid versions (through an existing account or a new code from the bookstore package) of Mastering Physics will be posted on D2L. At the end of the term a bonus MP assignment will be offered that can be completed to replace your lowest MP assignment grade

(At-home) laboratory experiments: There will be six lab experiments, four of which will be at-home experiments, one will be a worksheet style exercise, and one will be a remotely operated experiment.

Quizzes: There will be three synchronous quizzes that will be each held during scheduled lecture time. These will be individual open-book quizzes designed to take 33 minutes to complete. You will be given 50% more time to account for potential technical difficulties. The total time allotted for each quiz is therefore 50 minutes.

Quiz 1 - Friday Oct. 2nd, 16:00 - 16:50

Quiz 2 - Friday Oct. 23rd, 16:00 - 16:50

Quiz 3 - Friday Nov. 20th, 16:00 - 16:50

Final: This course will have a registrar scheduled synchronous final exam. The exam will be designed to take 2 hrs to complete with 50% extra time (1 hr) added to account for potential technical difficulties.

For any synchronous assessment, time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	50 %	45 %

This course has a registrar scheduled final exam.

4. Missed Components Of Term Work:

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

Missed Quiz

If you expect to be unable to or it will be problematic to write the quiz at the scheduled time (scheduled during regular lecture times) please fill in the "Quiz conflict" form on D2L and submit it to the Dropbox folder "Quiz conflicts". Supporting information and any relevant supporting documentation must be provided. Alternative arrangements will be made by the instructor on a case-by-case basis.

If you unexpectedly miss a scheduled quiz, you must fill in the "Missed Quiz" form on D2L and submit it to the Dropbox folder "Missed Quizzes" within 48 hours of the end scheduled end. A supporting document should be provided when applicable. Once the claim is substantiated, the alternative arrangements will be made by the instructor.

Missed Laboratory

If you expect you will miss a scheduled laboratory session please email your assigned TA and CC the course instructor as soon as possible.

If you unexpectedly miss your scheduled laboratory session, you must fill in the "Missed Laboratory" form (should be saved as an Excel file) posted on D2L and submit it to the Dropbox: "Missed Labs". A supporting document should be provided when applicable. Requests submitted more than 48 hours after the date of the missed lab will not be considered. Students are NOT allowed to come to a lab section different than their own without.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

Required Textbook(s):

Randall Knight, *Physics for Scientists and Engineers, 4th Ed*: Pearson.

Mastering Physics Assignments: Online assignments will be employed in this course. Instructions for accessing the free or paid versions (through an existing account or a new code from the bookstore package) of Mastering Physics will be posted on D2L.

To access the assignments go to www.pearsonmastering.com. The Mastering Physics course ID will be posted on D2L.

7. Examination Policy:

The three quizzes and the final exam will be synchronous individual open book exams. All quizzes and the final exam will be administered over D2L. An extra 50% time will be added to the intended writing time for each assessment to account for potential technical difficulties.

For any synchronous assessment, time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis.

Students should also read the Calendar, [Section G](#), on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also [Section E.2](#) of the University Calendar.

10. Human Studies Statement:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of

receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar

- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Center:** For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (syasa@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>)
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Physics & Astronomy, Dr. David Feder by email phas.ahugrd@ucalgary.ca or phone [403-220-8127](tel:403-220-8127). Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. [Student Ombudsman](#), Email: ombuds@ucalgary.ca.
- h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions

governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

Tentative lecture schedule:

Week starting	Topics	Text Section
Sept. 8	Electric fields of point charges	22.4, 22.5
Sept. 14	Electric dipoles, electric fields of charge distributions	23.1 - 23.7
Sept. 21	Electric flux and Gauss' law	24.1-24.6
Sept. 28	Biot-Savart law and Ampere's law	29.3-29.6
Oct. 5	Induced Electric Fields	30.3 - 30.6
Oct. 12	Displacement current, Maxwell's equations, EM waves	31.2 - 31.5
Oct. 19	Wave basics, power and intensity, polarization	16.3, 16.5, 16.7, 16.8, 31.6, 31.7
Oct. 26	Interference in 1D, thin film interference, interference in 2D	17.1 - 17.3, 17.5 - 17.8, 33.2
Nov. 2	Diffraction, interferometers	33.3 - 33.8
Nov. 9	Reading Week	
Nov. 16	Ray tracing, reflection, refraction	34.1 - 34.4
Nov. 23	Thin lenses, spherical mirrors	34.5 - 34.7
Nov. 30	Microscopes, telescopes	35.1 - 35.7
Dec. 7	Review	

Quizzes:

Quiz 1 - Friday Oct. 2nd, 16:00 - 16:50

Quiz 2 - Friday Oct. 23rd, 16:00 - 16:50

Quiz 3 - Friday Nov. 20th, 16:00 - 16:50

Laboratories:

There will be six lab experiments, four of which will be at-home experiments, one will be a worksheet style exercise, and one will be a remotely operated experiment. The at-home experiments are split into two parts: individual and group. The individual parts are to be completed on your own and must be submitted to D2L by 23:59 on the Monday of your scheduled lab week. The group parts will be completed in your scheduled lab over Zoom with your group and with guidance from your TA. A lab report will then be submitted as a group.

Lab schedule:

Week starting	Lab title	Notes
Sept. 8	No labs	
Sept. 14	Pendulum Uncertainty	At home experiment. Individual part due at 23:59 on Sept. 14th. Group part completed during scheduled lab session.
Sept. 21	No labs	
Sept. 28	Gauss's Law	Completed as a group in your scheduled lab session. This lab is a worksheet style exercise.
Oct. 5	No labs	
Oct. 12	Biot-Savart Law	Completed as a group in your scheduled lab session. This lab is a remotely operated experiment.
Oct. 19	No labs	
Oct. 26	Malus's Law	At home experiment. Individual part due at 23:59 on Oct 26th. Group part completed during scheduled lab session.
Nov. 2	No labs	
Nov. 9	Reading Week	

Week starting	Lab title	Notes
Nov. 16	Diffraction	At home experiment. Individual part due at 23:59 on Nov 16th. Group part completed during scheduled lab session.
Nov. 23	No labs	
Nov. 30	Lenses	At home experiment. Individual part due at 23:59 on Nov. 30th. Group part completed during scheduled lab session.
Dec. 7	No labs	

Course Incomes:

This course is the natural follow-up to PHYS 223. Students should be comfortable with the concepts of electric and magnetic fields learned there. Should be comfortable working with algebra, vectors, derivatives, and integrals. Students will build on the mathematical skills developed in PHYS 223, and/or other introductory physics and math courses.

Course Outcomes:

- By the end of the course students will have built on the physical principles and mathematical skills they learned in PHYS 223 and should be able to:
- Use Gauss’s law to find the electric field of a continuous charge distribution;
- Work with electric field and magnetic field vectors in three dimensions;
- Use Maxwell’s equations to show how light can be explained in terms of electromagnetic waves;
- Obtain experimental data and relate them to predicted physical laws governing electricity and magnetism;
- Analyze optical systems consisting of lenses and mirrors;
- Understand the effects of constructive and destructive interference, refraction, and diffraction of light.

Electronically Approved - Aug 20 2020 11:00

Department Approval