



COURSE OUTLINE

1. **Course:** PHYS 223, Introductory Electromagnetism, and Thermal Physics - Winter 2021

Lecture 01: MWF 12:00 - 12:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Jared Stang	jared.stang@ucalgary.ca	TBA	ONLINE	M 13:00-13:50, W 15:00-15:50, Th 13:00-13:50

Lecture 02: TR 12:30 - 13:45 - Online

Instructor	Email	Phone	Office	Hours
Dr. Claudia Gomes da Rocha	claudia.gomesdarocha@ucalgary.ca	403 220-7023	ONLINE	Tuesdays, 8:30 am - 9:30 am

Lecture 03: MWF 16:00 - 16:50 - Online

Instructor	Email	Phone	Office	Hours
Dr Jared Stang	jared.stang@ucalgary.ca	TBA	ONLINE	M 13:00-13:50, W 15:00-15:50, Th 13:00-13:50

Coordinator(s)

Name	Email	Phone	Office	Hours
Dr Andrew Yau	yau@ucalgary.ca	220-8825	ONLINE	M 08:00

When communicating with the instructors and course coordinator please allow 2-4 work days for a response to messages and e-mail inquires.

Physics questions should be asked on Piazza. Logistical questions could be directed to the Course Coordinator, or asked on Piazza.

Online Delivery Details:

This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

This course has a registrar scheduled, asynchronous final exam. The writing time is 2 hours + 50% buffer time, but the exam can be written any time in a 24-hour window.

Lectures via Zoom: L01: MWF 12:00-12:50; L02: TR 12:30-13:45; L03: MWF 16:00-16:50

Course Site:

D2L: PHYS 223 L01-(Winter 2021)-Introductory Electromagnetism, and Thermal Physics

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 211 or 221 or 227.

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 %	Date
Assignments (Mastering Physics) (10)	20	Due on Wednesday 23:59 (Open for two weeks, aim to complete during first week)
Labatorials (8)	15	Labatorials to be completed by students, with lab write-ups submitted individually via D2L Dropbox; video demonstrations and simulations are posted and TA will grade submissions at end of lab; TAs available via D2L Discussion Forums.
Pre-reading quizzes	5	Due on Mondays 11:30 am, submitted as D2L quizzes
In-class work sheets	10	To be submitted via D2L Dropbox by Monday 23:59 of the following week; graded based on completion.
In-class test	10	30-min test (plus 15 min online buffer) on D2L; Multiple-choice questions (MCQ) during the week of February 22, 2021
Midterm Exam*	15	due March 23 at 7:30pm - 1-hr exam (plus 30 min online buffer) on D2L;
Final Exam	25	2-hr exam (plus 60 min online margin) on D2L; Multiple-choice questions (MCQ)
Total	100	

*Students will be given a timed midterm designed to be completed in 1hr but students will be given 1.5hrs to account for any technical issues. Students will have a 24hr window prior to the due date to write but it must be submitted at the latest at 7:30pm on March 23. **If you wish to get the full 1.5hrs, you must start your exam on or before 6pm on March 23.**

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 will have a final exam that will be scheduled by the Registrar. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

The final exam will be administered using an on-line platform. Per section [G.5](#) of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform where the additional time will be added to the beginning of the registrar scheduled exam. E.g. If an exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the start time of the exam. This means that if the exam has a 1 hour buffer time,

- the latest you should start an asynchronous exam would be 8 am in order to be able to submit the exam at 11am and have the full 3 hours.

As your term work items (labs, assignments and exams) accumulate, the marks for students in PHYS 223 will be posted on D2L. The marks that appear on this website are the marks that will be used to determine each student's overall course grade. Check your marks frequently. **Missing or incorrectly posted term work marks should be reported to your instructor as soon as they are noticed.** You should be prepared to produce the original work to verify the requested correction.

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 midterm tests

Students who miss a midterm test for valid reasons will be granted an excused absence by the Course Coordinator provided that they notify the Course Coordinator by email at phys223@ucalgary.ca on the day after the midterm test, at the latest. The weight of the midterm test will be shifted to the final exam.

Missed Labatorials

Due to logistical reasons, it is not possible to make up for a missed labatorial. However, since there are 8 labatorials and a student

can earn a maximum of 2.5% for each labatorial attended, it is possible for a student to miss one or two labatorials and still achieve the maximum Lab Grade (15 out of 15%).

Missed assignments

Most of the Assignments are open for two weeks, but a student should be able to complete them a week after they open (the second week is added so that one could plan around one's other commitments).

Since there are 10 (graded) assignments, and a student can earn a maximum of 2.5% for each Assignment, it is possible for a student to miss one or two assignments and still achieve the maximum Assignment Grade (20 out of 20%).

Students who miss more than two Assignments for valid reasons should contact the Course Coordinator at phys223@ucalgary.ca. Requests for accommodations should be made before (or within 1 week after) the due date, for an assignment.

5. Scheduled Out-of-Class Activities:

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

6. Course Materials:

Recommended Textbook(s):

Knight, *Physics for Scientists and Engineers: A Strategic Approach, 4th Edition* Pearson.

Mastering Physics license (see information about on-line Assignments below)

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

7. Examination Policy:

All assessments are open resource, but interacting with other students is forbidden; formula sheet will be provided; calculator is allowed.

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 Services:** 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 (svsa@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 integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)
Student Academic Misconduct [Policy](#) and [Procedure](#)
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

- 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. 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.

FORMATIVE ASSESSMENTS

The following course components are designed to help you and the instructors assess your comprehension, learning needs, and academic progress during the course.

LABORATORIALS

Labatorials begin on Monday Feb 1, 2021. They take place online via Zoom, and students are assigned to a particular Lab Section by the Registrar's Office when enrolling in PHYS 223. In general, the format of the labatorials is as follows: Working in groups, students make their way through a carefully written workbook crafted to help students ponder, discuss, and learn concepts being covered in their lectures. TAs offer assistance and guidance, and check student's understanding periodically throughout the session, and evaluate one of the write-ups in a group at each checkpoint. The discussion follows the evaluation of the write-up. Labatorials typically involve a class demonstration, computer simulations, or some apparatus, and the tasks presented to students vary accordingly.

The Labatorials workbook documents will be available on D2L. Students are to print out or otherwise edit their own copies for use in their Labatorials session to do their work.

ALTERNATIVE DELIVERY FORMAT:

Lab TAs will be available for questions. You can ask your Lab TA a question via D2L Forum (Communication/ Discussions/ Lab section forum). In order to gain access, please self-enroll in a group (PHYS 223 Lab sections, e.g. if you are in Lab section B01, you should enroll in Group: Lab_section_B 1 by going to Communication/ Groups on D2L Lab site).

Labatorial 1	Electric charges and forces
Labatorial 2	Electric Fields
Labatorial 3	Equipotential Lines
Labatorial 4	Electric Circuits
Labatorial 5	Magnetic Field in a Slinky
Labatorial 6	Charge to mass ratio experiment
Labatorial 7	Pressure and Density
Labatorial 8	First Law of Thermodynamics

On-line ASSIGNMENTS

On-line assignments are due by 23:59 on Wednesday nights. The first graded assignment is due Wednesday, January 27th, 2021. Please note that a new assignment opens every week and the assignments remain open for two weeks. At any given point two assignments will be open. A practice, not for credit, Mastering Physics (MP) assignment will be made available for students to attempt (Assignment 0). Please see detailed schedule of the assignments below.

PHYS 223 Assignment schedule		
Assignment	Available	Due Date
Assignment 0	January 11, 2021	N/A practice
Assignment 1	January 13, 2021	January 27, 2021
Assignment 2	January 20, 2021	February 3, 2021
Assignment 3	January 29, 2020	February 10, 2021
Assignment 4	February 3, 2021	February 24, 2021
Practice In-class test	February 10, 2021	No due date
Assignment 5	February 10, 2021	February 24, 2021
Assignment 6	February 17, 2021	March 3, 2021
Assignment 7	March 3, 2021	March 10, 2021
Assignment 8	March 10, 2021	March 17, 2021
Assignment 9	March 17, 2021	March 31, 2021
Assignment 10	March 24, 2021	April 7, 2021
Practice Final	March 31, 2021	No due date

Please see D2L folder Content/ On-line Assignments for detailed visual instructions how to access MP if:

- You have a Pearson account from Fall 2020.
- You don't know if you have a Pearson account or forgot the password for your account
- You don't have a Pearson account but you want to register the code that came with your copy of the package from the bookstore.

- You don't have a Pearson account but you only want access to the assignments without purchasing access to the extra study resources or the eText.

Pre-reading Quizzes

The goal of the Pre-reading Material and Quizzes is to help to focus on important background materials before classes. The Quizzes are worth 5% and will be administered via D2L; will be due on Mondays (11:30 am) and will open a week before they are due. Your 10 highest grades will be used to calculate your final Pre-reading Quizzes grade.

Worksheet (WS) Problems

The goal of the Worksheet (WS) Problems is to provide the opportunity to practice problem solving in-class and test understanding of key physical concepts. Completed Worksheet (WS) Problems are to be submitted via D2L Dropbox on Monday at 11:59 pm of the following week. They are going to be marked for completeness and are worth 5% of your final grade. The two lowest grades will be dropped when calculating your final WS grade.

Work Along Problems (WAP)

The goal of the Work Along Problems (WAP) is to provide opportunity to "follow along" more complex derivations or computational solutions in-class. They are not graded, but complete solutions will be posted during the week following a given module.

SUMMATIVE ASSESSMENTS

The following course components are designed to assess your learning progress during (Midterm tests) and at the end of the course (Final exam).

IN-CLASS TEST

The In-class Test will be a 30-min in-class multiple-choice test (plus 15 min of online buffer) in the week of February 22, 2021 via D2L.

MIDTERM EXAM

The Midterm Exam will be a 1-hour multiple-choice, OOCA (Out of Class Activities) exam (plus 30-min online buffer) on March 23, 2021.

FINAL EXAM

The Final Exam's weight will be 25%. The exam will be administered online via D2L. The exam will be designed to be 2h, but you will be given 3h to complete your attempt. Additional time for the attempt will be provided for students registered with SAS according to the information described in the forms. No feedback will be provided until after the exam availability has ended. Instructors will not be available in real time to answer questions. If during the exam you have any questions or concerns, please submit them via email to phys223@ucalgary.ca within 24 hours after the exam.

If you are concerned that you might not be able to complete the exam online (for example due to unreliable internet connection or other technical challenges), please notify the Course Coordinator by email at phys223@ucalgary.ca. If you are not able to access D2L, you can email the course coordinator.

PHYS 223 DETAILED LECTURE SCHEDULE

PHYS 223 Lecture schedule			
Week	Dates	Text	Topic
1	Jan 11-15	22.1-5, 23.1 -2	Coulomb's law. Electric field of a point charge.
2	Jan 18-22	23.2-3	Distributions of point charges. Electric field of continuous charge distributions. Parallel plate capacitors.
3	Jan 25-29	23. 6, 25.1 - 5	Motion of charged particles in E fields. Electric potential energy of point charges. Electric Potential. V in a capacitor.
4	Feb 1-5	25. 6-7, 26.1 - 4	V due to point charges. The connection between E and V. E fields of charged conductors.
5	Feb 8-12	26.5, 27.1 - 5, 28.1 - 7	Capacitance and Capacitors. Resistance and Ohm's law. DC circuits.
6	Feb 22-26	29.1 - 5	Introduction to magnetism. Currents and magnetic fields.
7	Mar 1-5	29.7 - 9	Lorentz force. Cyclotron motion. Hall Effect. Magnetic forces on straight wires and current loops.
8	Mar 8-12	30.1 - 5	Induced current. Motional emf. Magnetic flux. Lenz's Law. Faraday's Law.
9	Mar 15-19	14.1 - 3, 18.1 - 5	Concepts of Pressure. Gauge Pressure. Thermodynamic state variables. Temperature. Phase changes.
10	Mar 22-26	18.6 - 7, 19.1 - 3	Ideal gases. Ideal gas processes. pV diagrams. Work in ideal gas processes. Heat.
11	Mar 29-Apr 2	19.4 - 7	First Law of thermodynamics. Thermal properties of matter. Calorimetry. Specific heats of gases.
12	Apr 5-9	20 1-4	Gas particle collisions and resulting temperature and pressure. Thermal energy and Specific Heat.

PHYS 223 Lecture schedule

Week	Dates	Text	Topic
13	Apr 12-16	N/A	Review.

COURSE INCOMES:

Students coming into PHYS 223 should be able to:

- Perform basic derivatives and integrals
- Apply vector notation and algebra in one and two dimensions
- Develop mathematical models of physical situations

Course Outcomes:

- By the end of the course, students will be expected to: Exploit and use symmetry to simplify physical problems in electricity and magnetism;
- Apply the principle of superposition to calculate the electric and magnetic fields of extended objects;
- Develop mathematical models of physical situations for electromagnetism and thermal physics;
- Carry out calculations symbolically (in terms of physical variables) and numerically (using appropriate values and their units);
- Obtain experimental data and relate them to predicted physical laws governing electricity and magnetism;
- Communicate and collaborate effectively within a team environment.

Electronically Approved - Jan 07 2021 12:03

Department Approval

Electronically Approved - Jan 08 2021 15:19

Associate Dean's Approval