



COURSE OUTLINE

1. **Course:** PHYS 223, Introductory Electromagnetism, and Thermal Physics - Winter 2023

Coordinator(s)

Name	Email	Phone	Office	Hours
Dr Christopher Cully	cmcully@ucalgary.ca	Please use email	SB 631	By appointment

Section(s)

Lecture 01 : MWF 12:00 - 12:50 in ENC 70

Instructor	Email	Phone	Office	Hours
Dr. Laura Mazzino	laura.mazzino@ucalgary.ca	403 220-8648	SB 533	Via zoom: Wed & Thu 10:30am - 11:30am

Lecture 02 : TR 12:30 - 13:45 in ENC 70

Instructor	Email	Phone	Office	Hours
Dr. Ziad Abusara	zabusara@ucalgary.ca	Contact Via Email	SB 646	Friday 3:00-4:30

Lecture 03 : MWF 16:00 - 16:50 in ENC 70

Instructor	Email	Phone	Office	Hours
Dr. Megan Gillies Deborah Gillies	dgillies@ucalgary.ca		SB 633	F 10:00-11:00

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

In Person Delivery Details:

Lectures, labs and exams for PHYS 223 will be in-person. Attendance at lectures is highly recommended. Attendance at labs and exams is required.

Questions about course logistics should be emailed to the course coordinator. Please start your email subject with the tag [PHYS 223] and allow a full work day for a response. For missed course components (e.g. a missed lab, quiz, etc.), please complete the relevant form on D2L.

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#).

Course Site:

D2L: PHYS 223 L01-(Winter 2023)-Introductory Electromagnetism, and Thermal Physics

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

Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Physics and Astronomy EDI Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that

enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues, please reach out to our Associate Head EDI, Claudia Gomes da Rocha (claudia.gomesdarocha@ucalgary.ca)

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:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Homework ¹	15%	Ongoing		
Electronic Response (Top Hat) ²	5%	Ongoing		
Surveys ³	0%	Ongoing		
Laboratorials ⁴	20%	Ongoing		
Quiz ⁵	10%	Feb 08 2023		
Midterm	20%	Mar 20 2023 at 07:30 pm (90 Minutes)	in-person	TBD
Registrar Scheduled Final Exam	30%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

¹ Roughly weekly homework sets, tentative dates below. Lowest homework grade will be dropped.

² Top Hat percentage grades will be multiplied by 1.25 and capped at 100%, so any score at or above 80% will result in a 100% grade on this component.

³ A 1% bonus will be added for students who complete 3 brief online surveys about science student attitudes. See below.

⁴ There will be 8 laboratorials (combinations of tutorial and laboratory components), completed in the lab sections.

⁵ Quiz will be conducted in-person in your regularly-scheduled lecture time, either on Wednesday February 8th or Thursday February 9th.

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 Registrar Scheduled Final exam that will be delivered in-person and on campus. [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 University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

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, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

Missed Labs

One missed lab may be completed for full credit during the period April 3-6. To request a make-up lab, please fill in the "Missed Labatorial" form on D2L. Requests submitted more than 7 days after the date of the missed lab may not be considered.

Missed Quiz

If you miss the quiz for any reason, please fill in the "Missed Quiz" form on D2L immediately. Grade weighting for a missed quiz will be shifted to the midterm exam. Requests submitted more than 7 days after the date of the missed quiz may not be considered.

Missed Midterm

If you miss the midterm for any reason, please fill in the "Missed Midterm" form on D2L immediately. There will be a deferred exam scheduled the following week.

Missed/Late Homework

Homework solutions will be released immediately after the homework is due; consequently, no extensions will be granted. The lowest homework grade will automatically be dropped to account for technical problems, sickness, etc. Please do not contact the course coordinator or your instructor if you miss homework questions.

Missed Top Hat Questions

The Top Hat component scores will be multiplied by 1.25 to account for any technical problems, sickness, etc. No further accommodations or exceptions will be made. Please do not contact the course coordinator or your instructor if you miss Top Hat questions.

5. Scheduled Out-of-Class Activities:

The following out of class activities are scheduled for this course.

Activity	Location	Date and Time	Duration
Midterm	TBD	Monday, March 20, 2023 at 7:30 pm	90 Minutes

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a conflict with the out-of-class-time-activity, please contact your course coordinator/instructor no later than **14 days prior** to the date of the out-of-class activity so that alternative arrangements may be made.

6. Course Materials:

Recommended Textbook(s):

R.D. Knight, *Physics for Scientists and Engineers: A Strategic Approach (4th or 5th ed.)* Pearson.

A TopHat license (free for UCalgary students at tophat.com) and a response device such as a phone, laptop or tablet is required. Lectures will be posted on D2L.

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:

Exams are closed-book with a formula sheet provided. Calculators are allowed, but must not be able to connect to the internet or other devices. Cell phones, music players and other electronic devices are not 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 their [website](#) or call [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](#). The complete University of Calgary policy on sexual violence can be viewed [here](#).
- d. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.
- e. **Student Union Information:** [SU contact](#), Email your SU Science Reps: science1@su.ucalgary.ca, science2@su.ucalgary.ca, science3@su.ucalgary.ca,
- f. **Academic Accommodation Policy:**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Dr. David Feder by email phas.ahugrd@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

- g. **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](#)
[Faculty of Science Academic Misconduct Process](#)
[Research Integrity Policy](#)

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

- h. **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.
- i. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). 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.
- j. **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.

Top Hat

Top Hat questions may include pre-reading questions due at the start of the lectures and/or in-class questions. A TopHat license (free for UCalgary students at tophat.com) and a response device such as a phone, laptop or tablet is required. Your instructor will give you further instructions in class and via D2L.

Laboratorials

Laboratorials begin on Monday Jan 16, 2023. You must attend the section (room and time) assigned through the Registrar's Office.

In general, the format of the laboratorials is as follows: working in groups, students make their way through a workbook designed to help students ponder, discuss, and learn concepts being covered in their lectures. TAs offer assistance and guidance, and check student understanding periodically throughout the session. Laboratorials typically involve a class demonstration, computer simulations, or some apparatus, and the tasks presented to students vary accordingly. The workbook documents will be available on D2L. Students are to print out their own copies (or bring a tablet with a pen) and take them to their lab section to do their work.

PHYS 223 Labatorial Schedule

Week	Dates	Labatorial
1	Jan 9-13	No labs
2	Jan 16-20	Lab 1: Electric fields and forces
3	Jan 23-27	Lab 2: Electric fields and motion of charged particles
4	Jan 30-Feb 3	Lab 3: Equipotential lines
5	Feb 6-10	Lab 4: Intro to electric circuits
6	Feb 13-17	No labs
Reading Week		
7	Feb 27-Mar 3	Lab 5: Magnetic fields
8	Mar 6-10	Lab 6: Electron charge to mass ratio
9	Mar 13-17	Lab 7: Pressure and Density
10	Mar 20-24	No labs
11	Mar 27-31	Lab 8: First law of thermodynamics
12	Apr 3-6	Make-up labs
13	Apr 11-12	No labs

Homework

Homework will be assigned on a weekly basis. The homework will be open for 1.5 weeks, meaning that two assignments may be open at the same time. Homework sets will be administered through D2L and Gradescope (accessible through D2L). A tentative schedule is given below.

Tentative Homework Schedule

Assignment	Available	Due
1	Wed Jan 11	Sun Jan 22 at 23:59
2	Wed Jan 18	Sun Jan 29 at 23:59
3	Wed Jan 25	Sun Feb 5 at 23:59
4	Wed Feb 1	Sun Feb 12 at 23:59
5	Wed Feb 8	Sun Feb 26 at 23:59
6	Wed Feb 15	Sun Mar 5 at 23:59
7	Wed Mar 1	Sun Mar 12 at 23:59
8	Wed Mar 8	Sun Mar 19 at 23:59
9	Wed Mar 15	Sun Mar 26 at 23:59
10	Wed Mar 22	Sun Apr 2 at 23:59

Surveys

As part of a multi-university study on sense of belonging among first year science students, the Canadian Consortium of Science Equity Scholars (CCSES) will be conducting 3 online surveys throughout the semester (early, mid, end-of-term). Links to the surveys will be distributed through D2L. For completing all 3 surveys, you will **earn a 1% bonus toward your final grade**. If you do not wish your response data to be collected and used in the project, you may decline consent and still receive the bonus grade. (That is, a response of "declined consent" will be considered a complete response for determining the bonus.) All 3 surveys must be completed to receive the bonus.

Detailed lecture schedule

Tentative Lecture Schedule

Week	Dates	Subject	Text
1	Jan 9-13	Coulomb's law. Electric field of a point charge.	22.1-5, 23.1 -2
2	Jan 16-20	Distributions of point charges. Electric field of continuous charge distributions. Parallel plate capacitors.	23.2-5

Tentative Lecture Schedule

Week	Dates	Subject	Text
3	Jan 23-27	Motion of charged particles in E fields. Electric potential energy of point charges. Electric Potential. V in a capacitor.	23. 6, 25.1 - 5
4	Jan 30-Feb 3	V due to point charges. The connection between E and V. E fields of charged conductors.	25. 6-7, 26.1 - 4
5	Feb 6-10	Capacitance and Capacitors. Resistance and Ohm's law. DC circuits.	26.5, 27.1 - 5, 28.1 - 7
6	Feb 13-17	Introduction to magnetism. Currents and magnetic fields.	29.1 - 5
Reading Week			
7	Feb 27-Mar 3	Lorentz force. Cyclotron motion. Hall Effect. Magnetic forces on straight wires and current loops.	29.7 - 9
8	Mar 6-10	Induced current. Motional emf. Magnetic flux. Lenz's Law.	30.1 - 7
9	Mar 13-17	Concepts of Pressure. Gauge Pressure. Thermodynamic state variables. Temperature. Phase changes.	14.1 - 3, 18.1 - 5
10	Mar 20-24	Ideal gases. Ideal gas processes. pV diagrams. Work in ideal gas processes. Heat.	18.6 - 7, 19.1 - 3
11	Mar 27-31	First Law of thermodynamics. Thermal properties of matter. Calorimetry. Specific heats of gases.	19.4 - 7
12	Apr 3-6	Gas particle collisions and resulting temperature and pressure. Thermal energy and Specific Heat.	20 1-.4
13	Apr 11-12	Review	N/A

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 05 2023 12:40

Department Approval

Electronically Approved - Jan 06 2023 15:01

Associate Dean's Approval