UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

Department of Physics & Astronomy
Science B 605
403 220-5385
phasoffice@phas.ucalgary.ca

COURSE OUTLINE

1. **Course:** PHYS 259, Electricity and Magnetism (for students in Engineering) - Winter 2024

Coordinator(s)

Name	Email	Phone	Office	Hours
Dr. Sean Stotyn	sean.stotyn@ucalgary.ca	403 210-7594	SA 101B	By appointment

Section(s)

Lecture 01 : W 08:00 - 10:45 in ICT 217

Instructor	Email	Phone	Office	Hours

Lecture 02 : W 08:00 - 10:45 in ENG 03

Instructor	Email	Phone	Office	Hours
Dr Timothy Andrew	timothy.andrew@ucalgary.ca	please email	SB 603	TBA

Lecture 03 : W 13:00 - 15:45 in ICT 217

Instructor	Email	Phone	Office	Hours
Dr Maryam Butt	maryam.butt@ucalgary.ca	TBA	TBA	TBA

Lecture 04 : W 13:00 - 15:45 in ENG 03

Instructor	Email	Phone	Office	Hours
Dr. Shabir Barzanjeh	shabir.barzanjeh@ucalgary.ca	403 589-6606	SB 507	Thursday 3 pm to 4 pm

Lecture 05 : W 16:00 - 18:45 in ICT 217

Instructor	Email	Phone	Office	Hours
Dr. Shabir Barzanjeh	shabir.barzanjeh@ucalgary.ca	403 589-6606	SB 507	Thursday 3 pm to 4 pm

Lecture 06 : W 16:00 - 18:45 in ENG 03

Instructor	Email	Phone	Office	Hours
Dr. Hadi Zadeh Haghighi	hadi.zadehhaghighi@ucalgary.ca		SB 504A	Monday 3:30 to 4:30 pm

Lecture 07 : R 08:00 - 10:45 in ICT 217

Instructor	Email	Phone	Office	Hours
Youssef Kora	TBA	TBA	TBA	TBA

Lecture 08 : R 08:00 - 10:45 in ENG 03

Instructor	Email	Phone	Office	Hours
Dr Timothy Andrew	timothy.andrew@ucalgary.ca	please email	SB 603	TBA

Lecture 09 : R 13:00 - 15:45 in ICT 217

Instructor	Email	Phone	Office	Hours
Dr Maryam Butt	maryam.butt@ucalgary.ca	TBA	TBA	TBA

Lecture 10 : R 13:00 - 15:45 in ENG 03

Instructor	Email	Phone	Office	Hours
Dr. Hadi Zadeh Haghighi	hadi.zadehhaghighi@ucalgary.ca		SB 504A	Monday 3:30 to 4:30 pm

Lecture 11 : F 08:00 - 10:45 in ENG 03

Instructor	Email	Phone	Office	Hours

Lecture 12 : F 08:00 - 10:45 in ICT 217

Instructor	Email	Phone	Office	Hours

Lecture 13 : F 15:00 - 17:45 in ICT 217

Instructor	Email	Phone	Office	Hours

Lecture 14 : F 15:00 - 17:45 in ENG 03

Instructor	Email	Phone	Office	Hours

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:

Each section has a one-hour, in person, live lecture per week on Monday or Tuesday. Additionally, each section has a three-hour, in person, studio activity session per week on Wednesday, Thursday, or Friday. Students are required to attend all in person lecture and activity sessions to receive credit for the associated course components.

Online Delivery Details:

This course does not follow a scheduled meeting pattern.

Students will be required to watch a set of asynchronous videos posted on D2L before the week the material is covered in the in-person classes. The length of the videos for a given week will be between 60 and 90 minutes. There will be a pre-lecture quiz on D2L for every set of asynchronous lecture videos.

Course Site:

D2L: PHYS 259 L01-L14 (Winter 2024)-Electricity and Magnetism (for students in Engineering)

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):
Mathematics 211 and 3 units from Mathematics 249, 265 or 275 and admission to the Schulich School of Engineering.

Antirequisite(s):
Credit for Physics 259 and either Physics 255 or 355 will not be allowed.

Mathematics 211 and 3 units from Mathematics 249 or Mathematics 265 or 275 and admission to the Schulich School of Engineering.

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
Assignments (online)[1]	11%	Ongoing		
Labs[2]	15%	Ongoing		
In-class activities[3]	14%	Ongoing		
Pre-lecture quizzes[4]	5%	Ongoing		
Midterm examination	20%	Feb 13 2024 at 06:00 pm (2 Hours)	in-person	TBD
Registrar Scheduled Final Exam	35%	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] To be completed on the WileyPLUS platform

[2] Held during the 3-hour weekly studio session on W/Th/F

[3] Top Hat questions and weekly group activities

[4] Weekly pre-lecture quizzes on D2L that are based on the content of the recorded lectures

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:**

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, 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, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation (Section M.1) for an excused absence, See FAQ.

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course may not be a viable option based on the design of this course.

Missed midterm

If a student misses the midterm, they must fill out the Missed Course Component form on D2L and submit it to the appropriate dropbox **within 2 days of the missed midterm**. If the request is approved, the weight of the missed midterm will be shifted to the final exam. A missed midterm that does not have an approved accommodation from the course coordinator will result in a zero for the midterm.

Missed labs

If a student misses a lab, they must fill out the Missed Course Component form on D2L and submit it to the appropriate dropbox **within 2 days of the missed lab**. If the request is approved, the student will be contacted about an appropriate accommodation. Students can miss at most one lab, barring extenuating circumstances. Any missed labs that do not have an approved accommodation from the course coordinator will result in a zero for that lab.

Missed group activities

If a student misses an in-class activity, they must fill out the Missed Course Component form on D2L and submit it to the appropriate dropbox **within 2 days of the missed activity**. If the request is approved, the weight of the missed activity will be shifted to the final exam. Students can miss at most one activity, barring extenuating circumstances. Any missed activities that do

not have an approved accommodation from the course coordinator will result in a zero for that activity.

5. **Scheduled Out-of-Class Activities:**

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

Activity	Location	Date and Time	Duration
Midterm examination	TBD	Tuesday, February 13, 2024 at 6:00 pm	2 Hours

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:**

Required Textbook(s):

Halliday, Resnick, Walker, *Fundamentals of Physics*: Wiley.

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 examinations will be closed-book, multiple choice tests. Students are allowed a pen/pencil, eraser, calculator, and student ID during an exam. A formula sheet and extra scrap paper will be provided. No cell phones or other communication devices such as smart watches may be used or worn during examinations. Programmable graphing calculators are permitted.

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 a s 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 t o 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.

LABS AND WORKSHEETS (15%)

During the weekly 3-hour studio session on W/Th/F, the last 2 hours will be either a worksheet or a lab (see course schedule below). Groups will be formed during the first session and will remain the same throughout the semester.

The format of a worksheet and lab session 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. The necessary documents will be available on D2L the week before and students are required to bring either a printed or digital copy with them to work on during the session.

IN-CLASS ACTIVITIES (14%)

Top Hat (3%):

As a vehicle to encourage class participation and student interaction, as well as to provide instructors with rapid, real-time feedback, the Top Hat student response system will be employed. Each lecture section will have its own Top Hat course name, which will be given to you by your instructor. The Top Hat questions are graded for 50% participation and 50% correctness. The type and number of questions asked over the semester are at the sole discretion of your instructor. The final grade for Top Hat is adjusted at the end of the term by dividing the raw percentage by 0.8 and capping at 100%. For example, if your grade is 85%, your adjusted grade will be 100% (85%/0.8 = 106%, capped at 100%). If your final grade is 76%, your adjusted final grade will be 95% (76%/0.8 = 95%).

Make sure you are using your correct **UCID** and your **ucalgary.ca email** address for your Top Hat enrollment, otherwise the grade for TopHat will not be counted towards your final.

Group Activities (11%):

There will be 11 weekly in-class activities held during the first hour of your 3-hour studio session on W/Th/F. Each will consist of a set of questions based on applications of the course material from that week (see course schedule table below). These questions and problems are to be worked on in groups, while the instructor and TAs are available to answer questions and assess understanding. Attendance at and participation during these activities is mandatory to receive credit for them.

PRE-LECTURE QUIZZES (5%)

There will be brief weekly quizzes on D2L (under Assessments/Quizzes) based on the weekly recorded lectures. The questions are intended to be straightforward to answer if the student watches the videos or reads the equivalent chapter sections of the textbook. The pre-lecture quiz for a given week will be released at 12:00 pm on the preceding Wednesday.

WILEYPLUS ONLINE ASSIGNMENTS (11%)

11 Weekly assignments on WileyPLUS will open on Wednesdays at 5:00 PM and close two weeks later at 11:59 PM. There will be multiple attempts available per question and no marks will be deducted for multiple attempts. Assignments come out weekly but they are open for 2 weeks, so there are usually 2 active assignments at the same time. It is recommended that the students complete a given assignment within the week that it is released so that they stay on top of them; the additional week is meant as a buffer and hence **no deadline extensions are granted on assignments**. Detailed instructions on how to purchase a WileyPLUS code and register will be provided on D2L.

Make sure you are using your correct **UCID** and your **ucalgary.ca email address** for your WileyPLUS enrollment, otherwise the grade for your assignments will not be counted towards your final.

Assignment #	Material Covered	Available to Students	Due date
1	Week 1	10-Jan-24	24-Jan-24
2	Week 2	17-Jan-24	31-Jan-24
3	Week 3	24-Jan-24	07-Feb-24
4	Week 4	31-Jan-24	14-Feb-24
5	Week 5	07-Feb-24	28-Feb-24
6	Week 6	14-Feb-24	06-Mar-24
7	Week 8	28-Feb-24	13-Mar-24
8	Week 9	06-Mar-24	20-Mar-24
9	Week 10	13-Mar-24	27-Mar-24
10	Week 11	20-Mar-24	03-Apr-24
11	Weeks 12 & 13	27-Mar-24	09-Apr-24

COURSE SCHEDULE

Week	Dates	Textbook Ref.	Weekly Content Topics	Lab Schedule
Week 1	Jan 8 - Jan 12	N/A	Intro to the course	Worksheet 1
		21.1–21.3	E&M intro, charges and polarization	
		22.1 - 22.3	Coulomb's Law, Vector Review, Superposition	
Week 2	Jan 15 - Jan 19	22.4	Symmetry, Electric Force from line of charge	Worksheet 2
		22.5	Limiting cases & Electric Fields	
		22.6	Electric Fields and Forces	
Week 3	Jan 22 - Jan 26	22.7	Electric Forces & Torque on a dipole	Lab #1: Electric Charges and Forces
		23.1, 23.2	Flux; Gauss' Law - Calculating Flux	
		23.2, 23.4	Gauss' Law - spherical symmetry, cylindrical symmetry	
Week 4	Jan 29 - Feb 2	23.5, 23.6	Planar Symmetry, Superposition	Lab #2: Electric Fields
		24.1	Electric potential energy	
		24.3, 24.4	Electric potential	
Week 5	Feb 5 - Feb 9	24.5, 24.7	Calculation of the potential for insulators	Lab #3 Gauss' Law
		24.2, 24.6	Equipotential surfaces, potential gradients	
		23.3	Charges on conductors	
Week 6	Feb 12 - Feb 16	24.8, 25.1	Charges on conductors continued, Intro to capacitance	Lab #4 Electric Potential
		25.2–25.4	Gauss' Law to get capacitance, energy storage	
		25.5	Dielectrics	
		Midterm Exam - Tuesday February 13 from 18:00–20:00, location TBD		
Week 7	Feb 19 - Feb 23	Term Break		No labs
Week 8	Feb 26- Mar 1	26.1, 26.2	Electric current, current density	Lab #5: Capacitors
		26.3, 26.4	resistance, resistivity, molecular view of Ohm's Law	
		27.4	RC circuits	
Week 9	Mar 4 - Mar 8	28.1, 28.2	Magnetic fields, motion of charged particles in magnetic fields	Lab #6: Resistivity of Play-Doh
		28.4, 28.5	Cyclotrons and mass spectrometer	
		28.3, 28.6	Magnetic force on a current-carrying conductor, Hall effect	
Week 10	Mar 11 - Mar 15	28.7, 28.8	Force and torque on a current loop (plus magnetic dipole)	Lab #7: Charge to Mass Ratio
		29.1, 29.2	Magnetic field of a current element	
		29.5	Biot-Savart Law: circular arc, finite line of current	
Week 11	Mar 18 - Mar22	29.3	Ampere's Law	Lab #8 Magnetic Field of a Slinky
		29.3	Coaxial cable, superposition	
		29.4	Solenoids and toroids	
Week 12	Mar 25 - Mar 28	30.1	Faraday's Law & Lenz's Law	No Labs
		30.2	Examples and applications (motional EMF)	
		No Studio Activity Session on March 27, 28 & 29 (University closed March 29)		
Week 13	Apr 2 - Apr 5	No Studio Lecture on April 1 & 2 (University closed on April 1)		Worksheet 3
		30.3	Examples and applications (motional EMF)	
		30.4, 30.5	Self-inductance, inductors, magnetic field energy	
Week 14	Apr 8 - Apr 9	N/A	Review	No Labs
		N/A	Review	

COURSE INCOMES:

Students coming into PHYS 259 should be able to:

- Demonstrate ability to solve the quadratic formula
- Use trigonometry and basic geometry to solve problems
- Employ basic algebraic manipulations
- Perform derivatives and integrals

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;
- Carry out calculations symbolically in terms of physical variables;
- Carry out calculations numerically, using appropriate values and their units;
- Obtain experimental data and relate them to predicted physical laws governing electricity and magnetism;

- and communicate and collaborate effectively within team environments.

Electronically Approved - Jan 06 2024 14:09

Department Approval

Electronically Approved - Jan 08 2024 10:07

Associate Dean's Approval