



COURSE OUTLINE

1. **Course:** PHYS 223, Introductory Electromagnetism, and Thermal Physics - Winter 2022

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

Instructor	Email	Phone	Office	Hours
Dr Jared Stang	jared.stang@ucalgary.ca	403 220-8073	SB 527A	F 15:00-16:20, ST037

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

Instructor	Email	Phone	Office	Hours
Dr. Claudia Gomes da Rocha	claudia.gomesdarocho@ucalgary.ca	403 220-7023	SB 537	Tuesdays, 8:30 am - 9:30 am

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

Instructor	Email	Phone	Office	Hours
Dr. Laura Mazzino	laura.mazzino@ucalgary.ca	403 220-8648	SB 533	Thu 9:30am-11am

Coordinator(s)

Name	Email	Phone	Office	Hours
Dr Andrew Yau	yau@ucalgary.ca	220-8825	SB 623	By Appointment

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.

To account for any necessary transition to remote learning in the winter 2022 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:

This course has two in-person components: Lectures and Labs.

There are 3 Lecture Sections: L01-L03, which have weekly lectures at different times of the week. See Section 1 above.

Likewise, there are multiple (as many as 36) Lab Sections, which are held at different days and times of the week.

A student must enroll into one of the Lecture Sections and Lab Sections, respectively.

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](#). **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, synchronous final exam. The writing time is 2 hours + 50% buffer time.

Lectures via Zoom (currently until at least end of February 2022): L01: MWF 12:00-12:50; L02: TR 12:30-13:45; L03: MWF 16:00-16:50

If you experience an issue that affects your ability to complete the online assessments, which can include (but is not limited to) issues with technology, time zone issues, caregiving responsibilities, or distractions within your test-taking environment, you will need to contact your instructor as soon as possible.

Course Site:

D2L: PHYS 223 L01-L03 (Winter 2022)-Introductory Electromagnetism, and Thermal Physics

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

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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 Acting Associate Head EDI, Jo-Anne Brown (jocat@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
Surveys (2)	1%	Ongoing		
In-class Work Sheets (12) ¹	5%	Jan 17 2022		
Assignments (10) ²	20%	Jan 28 2022		
Labs (7) ³	20%	Jan 31 2022		
In-class Quizzes (3) ⁴	24%	Feb 16 2022		
Registrar Scheduled Final Exam ⁵	30%	Will be available when the final exam schedule is released by the Registrar	online	Will be available when the final exam schedule is released by the Registrar

¹ Above date and time for 1st Work Sheet only; please see relevant section of Course Outline

² Above date is due date for first Assignment only. Please see Assignments Schedule below

³ Above data for Lab #1, Monday Lab Group only. Please see Lab Schedule below.

⁴ Quiz #1: This timed assessment will be available online on 2/16/2022 at 12 pm for L01, on 2/17/2022 at 13:30 pm for L02, and on 2/16/2022 at 4 pm, respectively. You will have 45 minutes to complete and submit it. Quiz #2: This timed assessment will be available online on 3/9/2022 at 12 pm for L01, on 3/10/2022 at 13:30 pm for L02, and on 3/9/2022 at 4 pm, respectively. You will have 45 minutes to complete and submit it. Quiz #3: This timed assessment will be available online on 3/30/2022 at 12 pm for L01, on 3/31/2022 at 13:30 pm for L02, and on 3/30/2022 at 4 pm, respectively. You will have 45 minutes to complete and submit it. If you experience an issue that affects your ability to complete the online assessments, which can include (but is not limited to) issues with technology, time zone issues, caregiving responsibilities, or distractions within your test-taking environment, you will need to contact your instructor as soon as possible.

⁵ This timed, synchronous assessment will be available online at a date and time set by the Registrar's Office. The assessment is designed to take you 2 hours of writing time with 1 hour of buffer time. It must be completed and submitted by the date and time set by the Registrar. If you experience an issue that affects your ability to complete the online assessments, which can include (but is not limited to) issues with technology, time zone issues, caregiving responsibilities, or distractions within your test-taking environment, you will need to contact your instructor as soon as possible.

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 on-line. [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.

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. Due to the scheduling of the final exams, the additional time will be added to **the end** of the registrar scheduled **synchronous** exam to support students. This way, your exam schedule accurately reflects the **start time** of the exam for any **synchronous** exams. E.g. If a **synchronous** 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 **end** time of the **synchronous** exam. This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9 am and finish at 12pm.

Course Components:

Component(s)	Weighting %	Date/Notes
Assignments (Mastering Physics)	20	Due on Friday 23:59 (Open for two weeks, aim to complete during first week)

Labs	20	Labs to be completed by students in Lab, with lab writeups submitted individually via D2L Dropbox; video demonstrations and simulations are posted where applicable, and TA will grade submissions at end of lab
In-class Work Sheets	5	To be submitted via D2L Dropbox by 23:59 of the following Monday; grade based on completion
In-class Quizzes	24	45-min, Multiple Choice (MC) and/or computational questions in-class
Surveys	1	2 Anonymus surveys
Final Exam	30	2 hr exam; Multiple Choice (MC) and/or computational questions (scheduled by Registrar's Office)
Total	100	

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.

The University of Calgary offers a [flexible grade option](https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade), 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.

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 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. Late or missed submissions not reported within 48 hours will not be accommodated. If an excused absence or submission is approved, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

Missed In-class Quizzes

Students who miss an In-class Quiz 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 quiz, at the latest. The weight of the quiz will be transferred to the final exam.

Missed Labs

Due to logistical reasons, it is not possible to make up for a missed Lab. However, since there are 7 Labs and a student can earn a maximum of 2.5% for each Lab attended, it is possible for a student to miss one of the Labs 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, 5th 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:**

If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested.

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/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-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:**

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.

- f. **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.
- 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.

LABS

Labs begin on Monday Jan 31, 2022. They take place in person, 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 Labs 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. The TA's will 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. Labs typically involve a class demonstration, computer simulations, or some apparatus, and the tasks presented to students vary accordingly.

The Labs workbook documents will be available on D2L. Students are to download their own copies for use in their Lab session to do their work.

There will be 8 Labs, including an optional Lab (Lab #2), with the following schedule:

Week	Week of*	Lab [1]
1	1/10/2022	NO LABS
2	1/17/2022	NO LABS
3	1/24/2022	NO LABS
4	1/31/2022	Lab 1 Electric Charges and Forces
5	2/7/2022	Lab 2 Electric Fields [*] Lab 3 Equipotential Lines
6	2/14/2022	Lab 4 Electric Circuits [2]
7	2/21/2022	NO LABS; READING WEEK
8	2/28/2022	Lab 5 Magnetic Field in a Slinky
9	3/7/2022	NO LABS [3]
10	3/14/2022	Lab 6 Charge to mass ratio experiment
11	3/21/2022	Lab 7 Pressure and Density
12	3/28/2022	NO LABS [4]
13	4/4/2022	Lab 8 First Law of Thermodynamics
14	4/11/2022	

[1] Lab sessions on Monday to Thursday

[2] Week of Quiz 1 (Week 1-4 topics)

[3] Week of Quiz 2 (Week 5-8 topics)

[4] Week of Quiz 3 (Week 9-11 topics)

[*] Lab 2 is an optional lab, involving only simulation.

Students would perform this lab on their own.

Both Pre-Lab and Lab Report due on 2/17/2022 (i.e., after Quiz 1)

Submitted lab would be graded, and counted as "one of the best six labs"

On-line ASSIGNMENTS

PHYS 223 uses Mastering Physics for online assignments. On-line assignments are due by 23:59 on Fridays. The first graded assignment is due Friday, January 28, 2022. 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.

Assignment	Material covered	Assignment Code	Available On:	Due date
Assignment 0	Intro to MP	A0	1/10/2022	1/28/2022
Assignment 01	Week 1	A1	1/12/2022	1/28/2022
Assignment 02	Week 2	A2	1/19/2022	2/4/2022
Assignment 03	Week 3	A3	1/26/2022	2/11/2022
Assignment 04	Week 4	A4	2/2/2022	2/18/2022
Assignment 05	Week 5	A5	2/9/2022	3/4/2022
Assignment 06	Week 6	A6	2/16/2022	3/11/2022
Assignment 07	Week 8	A7	3/2/2022	3/18/2022
Assignment 08	Week 9	A8	3/9/2022	3/25/2022
Assignment 09	Week 10	A9	3/16/2022	4/1/2022
Assignment 10	Week 11	A10	3/23/2022	4/8/2022
Practice Exam	Week 12	PE	3/30/2022	(N/A)

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

- 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. (This option is not recommended.)

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 optional and will be administered via D2L; they will be due on Mondays (11:30 am) and will open a week before they are due. The purpose of the Pre-reading Quizzes is to help your Instructor better target the areas of emphasis in the lectures.

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 the D2L Dropbox on Monday of the following week by 11:59 pm. They will 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.

In-Class Examples

The goal of the In-Class Examples is to provide an 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 (In-class Quizzes) and at the end of the course (Final exam).

IN-CLASS QUIZZES

The In-class Quizzes will be 40-min in-class tests involving multiple-choice and/or computational questions. One or more of the Quizzes may be administered online if necessary.

FINAL EXAM

The Final Exam's weight will be 30%. The exam will be administered online via D2L. The exam will be designed to be 2h long, but you will be given 3h to complete your attempt. Additional time for the final exam and the quizzes will be provided for students registered with SAS according to the information described in the Letter of Accommodation from SAS 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

Week	Mon	Fri	Topics	Textbook Chapter/Section
1	1/10/2022	1/14/2022	Coulomb's law. Electric field of a point charge.	22.1-5, 23.1 -2
2	1/17/2022	1/21/2022	Distributions of point charges. Electric field of continuous charge distributions. Parallel plate capacitors.	23.2-3
3	1/24/2022	1/28/2022	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	1/31/2022	2/4/2022	V due to point charges. The connection between E and V . E fields of charged conductors.	25.6-7, 26.1-4
5	2/7/2022	2/11/2022	Capacitance and Capacitors. Resistance and Ohm's law. DC circuits.	26.5, 27.1-5, 28.1-7
6	2/14/2022	2/18/2022	Introduction to magnetism. Currents and magnetic fields.	29.1-5
7	2/21/2022	2/25/2022	[Reading Week]	
8	2/28/2022	3/4/2022	Lorentz force. Cyclotron motion. Hall Effect. Magnetic forces on straight wires and current loops.	29.7-9
9	3/7/2022	3/11/2022	Induced current. Motional emf. Magnetic flux. Lenz's Law.	30.1-4
10	3/14/2022	3/18/2022	Concepts of Pressure. Gauge Pressure. Thermodynamic state variables. Temperature. Phase changes.	14.1-3, 18.1-5
11	3/21/2022	3/25/2022	Ideal gases. Ideal gas processes. pV diagrams. Work in ideal gas processes. Heat.	18.6-7, 19.1-3
12	3/28/2022	4/1/2022	First Law of thermodynamics. Thermal properties of matter. Calorimetry. Specific heats of gases.	19.4-7
13	4/4/2022	4/8/2022	Gas particle collisions and resulting temperature and pressure. Thermal energy and Specific Heat.	20.1-4
14	4/11/2022	4/15/2022	Review [Last Day of Class: Tue 4/12]	
15	4/18/2022	4/22/2022	[Start of Final Exam period: Tue 4/19]	

Course Incomes:

Students coming into PHYS 223 should be able to:

- Perform basic derivatives and integrals

- Apply vector notation and algebra in kinematics and dynamics problems in one and two dimensions

Carry out calculations symbolically (in terms of physical variables) and numerically (using appropriate values and their units)

Obtain and analyze experimental data, and relate them to physical laws governing kinematics and dynamics

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 21 2022 08:54

Department Approval

Electronically Approved - Jan 22 2022 21:28

Associate Dean's Approval