COURSE OUTLINE

1. **Course:** PHYS 223, Introductory Electromagnetism, and Thermal Physics - Summer 2022
   Lecture 01: MWF 10:00 - 11:50 in SB 142

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mehdi Dehghany Mohammad-Abady</td>
<td><a href="mailto:mehdi.dehghanymohamm@ucalgary.ca">mehdi.dehghanymohamm@ucalgary.ca</a></td>
<td></td>
<td>TBA</td>
<td>Fridays 12noon-12:30 pm (ONLY BY SCHEDULED APPOINTMENT)</td>
</tr>
</tbody>
</table>

   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:**
   
   This course has two in-person components: Lectures and Labs.
   There is one Lecture Section: L01, which has weekly lectures on Monday, Wednesday and Friday from 10:00 am to 11:50 am.
   There are multiple lab sections which are held at different days and times of the week.
   A student must enroll into the Lecture Section and one of the Lab Sections.

   **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-(Summer 2022)-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 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:
<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight</th>
<th>Due Date (duration for exams)</th>
<th>Modality for exams</th>
<th>Location for exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>laboratory (in-person)</td>
<td>15%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seven Weekly Assignments</td>
<td>21%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One Midterm Exam (in-person)</td>
<td>26%</td>
<td>Jul 22 2022 at 10:00 am (110 Minutes)</td>
<td>in-person</td>
<td>SB 142</td>
</tr>
<tr>
<td>Registrar Scheduled Final Exam</td>
<td>38%</td>
<td>Will be available when the final exam schedule is released by the Registrar</td>
<td>in person</td>
<td>Will be available when the final exam schedule is released by the Registrar</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum % Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95 %</td>
</tr>
<tr>
<td>A</td>
<td>90 %</td>
</tr>
<tr>
<td>A-</td>
<td>85 %</td>
</tr>
<tr>
<td>B+</td>
<td>80 %</td>
</tr>
<tr>
<td>B</td>
<td>75 %</td>
</tr>
<tr>
<td>B-</td>
<td>70 %</td>
</tr>
<tr>
<td>C+</td>
<td>65 %</td>
</tr>
<tr>
<td>C</td>
<td>60 %</td>
</tr>
<tr>
<td>C-</td>
<td>55 %</td>
</tr>
<tr>
<td>D+</td>
<td>50 %</td>
</tr>
<tr>
<td>D</td>
<td>45 %</td>
</tr>
</tbody>
</table>

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 3 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](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.

An email prior to due date to your course instructor (if missing an assignment) or lab instructor (if missing a lab) with detail explanation of why an assessment component is missed suffice. The approval is under discretion of your course/lab/TA instructor.

Assignments:
There are seven assignments in this course. They will be released on the D2L course website in timely manner. Every assignment is due on Friday at 4:30 pm unless otherwise stated. Due dates are firm and no late assignment is accepted. Paper solutions are to be dropped in your assigned TA dropbox.

If an excused assignment is approved by your TA, Mark for ONLY one missed assignment will be transferred to other assignments.

Labs:
Due to logistical reasons, it is not possible to make up for a missed Lab. Students should make every effort to attend all the labs.

If an excused absence from the lab is approved by your lab instructor, mark for ONLY one missed lab will be transferred to other labs.
5. **Scheduled Out-of-Class Activities:**

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

6. **Course Materials:**

   Required Textbook(s):


   No Mastering Physics license is needed.

   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 [E Learning](https://www.ucalgary.ca) online website.

7. **Examination Policy:**

   No aids are allowed on tests or examinations.

   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. **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.

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 fulfill 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:** SU contact, Email SU Science Rep: sciencerep1@su.ucalgary.ca, Student Ombudsman

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.

*****Course tentative schedule*****

<table>
<thead>
<tr>
<th>week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
<th>Chapters/sections</th>
<th>Important notes</th>
</tr>
</thead>
</table>
| 1    | **Electromagnetism** | Distributions of point charges | July 1st | 22.1-5, 23.1-2, 23.2 | Assignment One is due on Friday at 4:30 pm  
Lab 1 on June 30th |
|      | Coulomb’s law | Electric field (E) of a point charge, Vector notation | No class | | |
|      | Electric field of continuous charge distributions | | | | |
| 2    | Parallel plate capacitors, Uniform Electric fields | Motion of charged particles in Electric fields | Electric potential energy of point charges | 23.2-3  
23.6  
25.1-5 | Assignment Two is due on Friday at 4:30 pm  
Lab 2 on July 7th |
|      | V due to point charges | E fields of charged conductors | Resistance and Ohm’s law | | |
|      | The connection between E and V | Capacitance and Capacitors | DC circuits | | |
| 3    | Introduction to magnetism | Lorentz force | Midterm Exam | 29.1-5  
29.7-9  
30.1-4 | Assignment Four is due on Friday at 4:30 pm  
Lab 5 on July 19th |
|      | Currents and magnetic fields | Cyclotron motion | July 22nd | | |
|      | Magnetic forces on straight wires and current loops | Hall Effect. | | | |
| 4    | Induced current | **Thermodynamics** | Phase changes | 14.1-3  
18.1-5 | Assignment Fives due on Friday at 4:30 pm  
Lab 6 on July 26th  
Lab 7 on July 28th |
|      | Motional emf | Concepts of Pressure | Ideal gases | | |
|      | Magnetic flux Lenz’s Law | Thermodynamic state variables | PV diagrams | | |
|      | | Temperature | Ideal gas processes | | |
| 5    | August 1st | Work in ideal gas processes | Thermal properties of matter. | 18.6-7  
19.1-3 | Assignment Six is due on Friday at 4:30 pm  
Lab 8 on August 2nd |
| No class | Heat | Calorimetry | With and without phase change | | |
|      | First Law of thermodynamics | | | | |
| 6    | Specific heat of gases | Gas particle collisions and resulting temperature and pressure | | 19.4-7  
20.1-4 | Assignment Seven is due on the last day of classes at 4:30 pm |
|      | | Thermal energy and Specific Heat | | | |

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.