



COURSE OUTLINE

1. **Course:** PHYS 697.22, Topics in Contemporary Physics - Fall 2022, Topic: Solar-Terrestrial Physics

Lecture 01 : MWF 14:00 - 14:50 in SS 115

Instructor	Email	Phone	Office	Hours
Dr. Emma Spanswick	elspansw@ucalgary.ca	403 220-6339	SB 636	TBA
Dr. Eric Donovan	edonovan@ucalgary.ca	403 220-6337	SB 638	TBA
Levan Lomidze	TBA	TBA	TBA	TBA

Some course material will require data analysis and programming. Recommended programming languages are IDL and Python, however students are free to use other languages. The course material will require students to write code to read, analyze and plot data, as well as interface with a Tsyganekno Geomagnetic Field Model through the publicly available GEOPACK libraries. Any programming language that can interface with GEOPACK can be used in this course.

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:

All course components are in-person.

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 697.22 L02-(Fall 2020)-Topics in Contemporary 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.gomesdarocho@ucalgary.ca)

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

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
Module #1 Final Assessment ¹	12%	Ongoing		
Assignments (2 per Module)	60%	Ongoing		
Module #2 Final Assessment ²	12%	Ongoing		
Module #3 Final Assessment ³	12%	Ongoing		
Introductory Presentation	4%	Sep 12 2022		

¹ End of Module 1

² End of Module 2

³ End of Module 3

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 %

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.

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

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

6. **Course Materials:**

No textbook is required. Recommended reading:

- Solar-Terrestrial Environment, J.K. Hargreaves
- Ionosphere, R. Schunk and A. Nagy
- Introduction to Space Physics, M. G. Kivelson and C.T. Russell
- Basic Space Plasma Physics, W. Baumjohann and R. A. Treumann
- Introduction to Ionospheric Physics, H. Rishbeth and O.K. Garriott
- Aeronomy, P. M. Banks and G. Kockarts
- Physics of the Upper Polar Atmosphere, A. Brekke
- Physics of the Earth's Space Environment, G. W. Prölss

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:**

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 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: [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 Description**

This course will provide a physics-based overview of the solar terrestrial environment and its dynamics, at a level appropriate for beginning graduate students. Topics will include the Sun; the solar wind and interplanetary magnetic field; the ionosphere and thermosphere; ionospheric chemistry and dynamics; and the structure of the magnetosphere and its plasma populations.

◦ **Course Learning Income**

Students should be functioning at the level of a senior undergraduate in Physics or related discipline. Students are expected to be able to work with statistical physics, electrodynamics, vector calculus, simple numerical methods, and basic computer programming. No prior knowledge of space or plasma physics is required.

◦ **Course Learning Outcomes**

The goal is for students to; (a) develop a space physics vocabulary that will enable meaningful discussions with space physics researchers, (b) develop an understanding of basic physical concepts that apply in ionosphere and magnetosphere, and (c) develop the ability to work with publicly available space physics data and models.

- **Syllabus**

Module 1: The Ionosphere

- Earth’s neutral atmosphere, composition and temperature structure
- Neutral atmospheric dynamics
- Ionization production and loss
- Ionospheric density profile
- Ionospheric plasma transport
- Dynamics and morphology of the ionosphere
- Ionospheric measurements and modeling

Module 2: The Magnetosphere

- The magnetopause and Magnetotail
- Magnetospheric Configuration and Standard Geomagnetic Indices
- Magnetospheric Models and Particle Tracing
- CDAWeb data

Module 3: The Magnetosphere Cont.

- The Central Plasma Sheet (let’s build one)
- The meaning of ‘boundaries’ (IB, plasmopause, Alfven Layers, OCB, inner edge, etc.)
- Boundaries as seen in the Ionospheric and Magnetosphere in models and in data

Schedule

Week	Dates	Lecture	Instructor	Lecture/Content Plan
Week 1	Sept 7 - 9	2022-09-07	All	Intro / Missions you Should Know
		2022-09-09	Donovan	Intro to the System
Week 2	Sept 12 - 16	2022-09-12	All	Class Presentations
		2022-09-14	All/Lomidze	Class Presentations Cont. / Module #1
Week 3	Sept 19-23	2022-09-16	Lomidze	Module #1
		2022-09-19	Lomidze	
		2022-09-21	Lomidze	
Week 4	Sept 26-30	2022-09-23	Lomidze	NASA Mission Landscape (Guest Lecture: Elizabeth MacDonald)
		2022-09-26	Spanswick	
		2022-09-28	Lomidze	
		2022-09-30		No Classes
Week 5	Oct 3 -7	2022-10-03	Lomidze	Module #1
		2022-10-05	Lomidze	
		2022-10-07	Lomidze	
Week 6	Oct 10-14	2022-10-10		No Classes
		2022-10-12	Lomidze	Module #1
		2022-10-14	Lomidze	
Week 7	Oct 17-21	2022-10-17	Spanswick	Module #2
		2022-10-19	Spanswick	
		2022-10-21	Spanswick	
Week 8	Oct 24-28	2022-10-24	Spanswick	
		2022-10-26	Spanswick	
		2022-10-28	Spanswick	
Week 9	Oct 31-Nov4	2022-10-31	Spanswick	
		2022-11-02	Spanswick	
		2022-11-04	Spanswick	
	Nov7-11	2022-11-07		No Classes
		2022-11-09		No Classes
		2022-11-11		No Classes
Week 10	Nov14-18	2022-11-14	Donovan	Module #3
		2022-11-16	Donovan	
		2022-11-18	Donovan	
Week 11	Nov21-25	2022-11-21	Donovan	
		2022-11-23	Donovan	
		2022-11-25	Donovan	
Week 12	Nov28-Dec2	2022-11-28	Donovan	
		2022-11-30	Donovan	

		2022-12-02	Donovan
Week 13	Dec5-7	2022-12-05	Donovan
		2022-12-07	Donovan

Electronically Approved - Sep 14 2022 19:22

Department Approval