UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS AND ASTRONOMY
COURSE OUTLINE

1. **Course:** Physics 697, Solar-Terrestrial Physics Winter 2017

   Time and Location: MWF | 11 – 11:50 | SS 115

   Lecturers:
   - Part A, Dr. L. Lomidze | SB634 | levan.lomidze@ucalgary.ca
   - Part B, Dr. G. Perry | SB625 | perry@phys.ucalgary.ca
   - Part C, Dr. E. Spanswick | SB636 | elspansw@ucalgary.ca

   Instructor of record (for administrative issues): Dr. David Knudsen | SB638 | 403.220.8651 | knudsen@ucalgary.ca

   Course Website: d2l.ucalgary.ca

   Departmental Office: SB 605, 403-220-5385, phasugrd@ucalgary.ca

2. **Prerequisites:** Students are expected to have a background in electromagnetism, equivalent to that required for students entering at least their first year of graduate studies. Some knowledge of basic plasma physics will be assumed; this material can be learned independently during the course if needed.

3. **Grading**: The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

   - Assignments 60%
   - Exam 1 10%
   - Exam 2 10%
   - Exam 3 10%
   - Final Project 10%

   Percentage to letter grade conversion scale:

> = 97 %	A +	> = 77 %	B +	> = 62 %	C +	> = 50%	D +
> = 87 %	A	> = 72 %	B	> = 57 %	C	> = 48 %	D
> = 82 %	A -	> = 67 %	B -	> = 52 %	C -	< 48 %	F

4. **Missed Components of Term Work**: The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize himself/herself with these regulations. See also Section E.6 of the University Calendar.

5. **Scheduled out-of-class activities:** Term report presentations may be scheduled outside of class. **REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY**. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

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

7. **Examination Policy**: Allowable materials (e.g. notes, reference books, calculators) will be announced prior to each exam. Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees**: None.

9. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also Section E.2 of the University Calendar.

10. **Human studies statement:** If this course is being evaluated for education research, you will be given separate paperwork indicating whether students in the course are willing to part of that study. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

(a) **Academic Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties.

(b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

(c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.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, preferably in writing, to the Associate Head of the Department of Physics and Astronomy, Dr. David Feder, by email (dfeder@ucalgary.ca) or by phone (403.220.3638).

(d) **Safewalk:** Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, 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 also http://www.ucalgary.ca/secretariat/privacy.

(f) **Student Union Information:** VP Academic Phone: 220-3911 Email: suvpaca@ucagary.ca.
SU Faculty Rep: Phone: 220-3913
Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; http://ucalgary.ca/provost/students/ombuds

(g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

12. OTHER COURSE RELATED INFORMATION:

(a) Course Description

This course will provide a physics-based overview of the solar terrestrial environment and its dyanmics, 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.

(b) Course Learning Outcomes

(c) Course Learning Incomes

(d) Syllabus

A	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
B	Convection - The Sun and Heliosphere - The Solar Wind and Interplanetary Magnetic Field (IMF) - IMF-Magnetosphere-Ionosphere coupling - Birkeland and ionospheric currents - Ionospheric convection and dynamics
C	The Magnetosphere - The magnetopause and Magnetotail - Magnetospheric Configuration and Standard Geomagnetic Indices

	➢ Magnetospheric Models and Particle Tracing

Department Approval_____Date_____