



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

1. **Course:** Physics 699 Special Topics Pertaining to Space-borne Ion Mass Spectrometry Winter 2017

**Instructor:** Dr. Andrew Yau | SB623 | 403-220-8825 | [yau@ucalgary.ca](mailto:yau@ucalgary.ca) | Office Hours: Friday 15:00

**Lecture Sections:** N/A

**Course Website:** N/A

**Departmental Office:** SB 605, 403-220-5385, [phasugrd@ucalgary.ca](mailto:phasugrd@ucalgary.ca)

2. **Prerequisites:** Background should include PHYS 611 Statistical Physics

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:

Presentations	60%
Essay	40%

Evaluation will be based upon the three presentations (20% of the total mark each) and the essay (40% of the total mark). Each of the presentations will be evaluated for:

Presentation Evaluation Scheme

- Content (70%)
- Organization (10%)
- Style (10%)
- Delivery (10%)

Essay Evaluation Scheme

- Content (70%)
- Organization and presentation (30%)

Percentage grades will be given for all elements of term work. A weighted course percentage will be calculated for each student.

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:** None.

**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:**

**Online Course Components:**

7. **Examination Policy:** Exams will be closed book, closed notes, but a calculator will be allowed. 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:** N/A

**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](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](mailto: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@ucalgary.ca](mailto:suvpaca@ucalgary.ca).  
SU Faculty Rep: Phone: 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca)  
Student Ombuds Office: 403 220-6420 Email: [ombuds@ucalgary.ca](mailto: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](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

## 12. OTHER COURSE RELATED INFORMATION:

### (a) Course Description

The student will be assigned to:

- Review the literature on a series of topics listed below and summarize her findings in three 20 minute presentations;
- Undertake a data analysis project in which the student will reduce and analyze existing ion mass spectrometer data from a scientific satellite, and summarize her findings in a written essay.

The three topics are:

1. Satellite-borne radio-frequency ion mass spectrometers
2. Time-of-flight ion mass spectrometers
3. Imaging techniques for low-energy ion energy, mass, and/or angular distributions

The data analysis project will utilize data from the CASSIOPE Enhanced Polar Outflow Probe (e-POP) Imaging and Rapid-Scanning Ion Mass Spectrometer (IRM) instrument. The data reduction and analysis will entail the reduction of IRM observation data in the topside ionosphere into, and the scientific analysis of the resulting ion mass composition, density and velocity distributions.

### (b) Course Learning Outcomes

- Acquired advance knowledge in modern ion mass spectrometric techniques in space
- Acquired hands-on experience in reduction and analysis of space-borne ion mass spectrometric data

### (c) Course Learning Incomes

- Graduate level statistical physics, electromagnetism
- Scientific programming skills

### (d) Syllabus

The three topics are:

- 1) Satellite-borne radio-frequency ion mass spectrometers
- 2) Time-of-flight ion mass spectrometers
- 3) Imaging techniques for low-energy ion energy, mass, and/or angular distributions

### (e) Lab Schedule N/A

Department Approval \_\_\_\_\_ Date \_\_\_\_\_