



**REVISED COURSE OUTLINE FOR REMOTE LEARNING**

To account for the necessary transition to remote learning from March 13 onward, adjustments have been made to assessment deadlines and requirements so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff). If you are unable to meet the deadlines or requirements specified, please connect with your course instructor to work out alternative dates/assessments.

1. **Course:** ASPH 509, High Energy Astrophysics and Cosmology - Winter 2020

Lecture 01: MWF 09:00 - 09:50 - Remote Learning (check with your instructor or coordinator for details)

Instructor	Email	Phone	Office	Hours
Dr. Denis Leahy	leahy@ucalgary.ca	403 220-7192	SB 529	10-11am WF (changed to online, as of Mar. 16, 2020)

**Course Site:**

D2L: ASPH 509 L01-(Winter 2020)-High Energy Astrophysics and Cosmology

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

2. **Requisites:**

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

**Prerequisite(s):**

Astrophysics 401, Physics 325, 343 and Mathematics 375.

**Note(s):**

- a. Concurrent or prior enrolment in Astrophysics 403 is highly recommended.

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:

Component(s)	Weighting %
Final Exam	10
Assignments	45
8 in-class quizzes	10
4 on-line quizzes	5
In-class test#1	20
On-line test#2	10

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
<b>Minimum % Required</b>	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	50 %	45 %

The in-class test#1 was held on Fri. Feb. 14 9am-9:50am.

The on-line test#2 is to be on Fri. Mar 20 at 9am-11am. The test is intended to be completed in 1 hour, with 1 hour given to upload the answers to D2L.

The final exam is now a 1 hour test, instead of original planned 3 hour test, and the new course weight is 10%.

The final exam will be released on Fri. Apr. 17 at 9 am, and due on Fri. Apr. 17 11am. The extra time is to allow for upload of answers to D2L. The answers are due in a Dropbox folder on D2L which will be created for the exam. Formats for answers: they will be printed in black and white on paper by the instructor for marking, thus pdf is preferred but other formats (e.g. photos) will be accepted if they are high enough quality for your writing to be clearly legible.

#### 4. **Missed Components Of Term Work:**

The University has suspended requirements for students to provide evidence for reasons for absences so please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations. Please let your instructor know immediately if you are ill and cannot meet the deadlines specified.

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

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

#### 6. **Course Materials:**

Required Textbook(s):

Rosswog and Bruggen, *Introduction to High Energy Astrophysics*: Cambridge University Press.

In class quizzes will be held once per week, with duration 10 minutes. For each quiz, 6 short answer questions will be posted in advance and 3 of the 6 will be selected for the quiz.

Two in-class tests are scheduled (see class calendar below). The tests will consist of problem solving questions related to the course content of the previous few weeks prior to the test.

NEW: because of COVID-19, the second test, quizzes 9-12, and final exam will be on-line through D2L.

#### 7. **Examination Policy:**

No aids are allowed on tests or examinations, except as specified on the test sheet.

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 Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. 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](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208).
- d. **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. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- f. **Academic Accommodation Policy:** 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 [procedure-for-accommodations-for-students-with-disabilities.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 & Astronomy, Dr. David Feder by email [phas.ahugrd@ucalgary.ca](mailto:phas.ahugrd@ucalgary.ca) or phone 403-220-8127. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **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.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). [Student Ombudsman](#), Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca).
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

- k. **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.
- l. **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 Syllabus

### Topics:

Equations of fluid dynamics and shock waves  
Radiation processes- synchrotron;  
Physics of supernova explosions and supernova remnants  
Properties of neutron stars, pulsars and magnetars  
Structure and equation of state of neutron stars;  
Compact binary systems, dynamics of binaries and properties of X-ray binaries  
Gamma-ray bursts: observed properties and models;  
Properties of active galactic nuclei

Expected prior knowledge for students: Astrophysics: basic nature of stars, galaxies and the interstellar medium, properties of stellar evolution, equation of state. Physics: properties of radiation, atoms, and spectral lines, basics of nuclear physics and atomic physics. Mathematics: multivariate calculus and differential equations. Ability to carry out algebraic and calculus calculations and plot graphs using a programming language (e.g. Python, Mathematica).

## Course Calendar

Jan 15 quiz 1  
Jan 22 quiz 2  
Jan 24 Assignment 1 due  
Jan 29 quiz 3  
Feb 5 quiz 4  
Feb 7 Assignment 2 due  
Feb 12 quiz 5  
Feb 14 in-class test #1  
Feb 26 quiz 6  
Feb 28 Assignment 3 due  
Mar 4 quiz 7  
Mar 11 quiz 8

COVID-19 response: assignments schedule is unchanged.

Mar 13: in-class test #2: changed to on-line for Mar 20  
Mar 18 quiz 9: changed to on-line  
Mar 25 quiz 10: changed to on-line  
Mar 27 Assignment 4 due  
Apr 1 quiz 11: changed to on-line  
Apr 8 quiz 12: changed to on-line  
Apr 13 Assignment 5 due

## Course Outcomes:

- Develop a knowledge base of theories, concepts and models with the area of high energy astrophysics.
- Collect and critically evaluate quantitative and qualitative information.
- Use well established methods to develop different approaches to problem solving.
- Formulate arguments based on concepts, information and theories and communicate them in writing and orally

- Apply knowledge in a variety of contexts, including new situations.

Electronically Approved - Mar 21 2020 15:48

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**Department Approval**

Electronically Approved - Mar 22 2020 19:45

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**Associate Dean's Approval for alternate final examination arrangements or remote learning**