



## COURSE OUTLINE

### 1. **Course:** ASPH 307, Introduction to Observational Astrophysics - Winter 2021

Lecture 01: TR 09:30 - 10:45 - Online

<b>Instructor</b>	<b>Email</b>	<b>Phone</b>	<b>Office</b>	<b>Hours</b>
Dr Philip Langill	pplangil@ucalgary.ca	403 220-5402	SA 101B	See Below

#### **Online Delivery Details:**

This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.

All ASPH307 classes will be facilitated using the Zoom online platform at the days and time scheduled by the Registrar's Office. The required Zoom link and password will be posted on D2L.

To be allowed into these online classes students are required to use their actual first and last names, and their associated ucalgary e-mail address.

The online Zoom classes will be recorded and posted on D2L.

#### **Course Site:**

D2L: ASPH307W21 - Observational Astrophysics

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

Dr. Langill's Office Hours for ASPH 307 will be Wednesdays from 11 am to 1 pm. It may be necessary to change this occasionally due to scheduling conflicts. If any changes are eminent, new office hours will be communicated via D2L and/or during lecture.

### 2. **Requisites:**

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

#### **Prerequisite(s):**

Astrophysics 213 or 305.

#### **Antirequisite(s):**

Credit for Astrophysics 307 and 507 will not be allowed.

### 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 %	Date
Data Acquisition Participation	2.5	
3 Observing Projects	35	
Assignments	20	
Midterm Exam	15	March 4th
Final Exam	25	
Teammate Evaluations	2.5	

Typically, targets are selected via group discussion in lecture, appropriate for the project at hand, and other considerations involving equipment available, location in the sky, and time of year. When the weather allows we meet as a group in the evening after sunset via zoom. The data is acquired remotely using telescopes and detectors at the Rothney Astrophysical Observatory. Depending on the details of the project, data collection observing runs could take between 2 and 4 hours.

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>	92 %	85 %	80 %	75%	70%	65 %	60 %	55%	50%	45 %	40 %

This course will have a final exam that will be scheduled by the Registrar. [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 2 hours.

The final exam will be administered using an on-line platform. Per section [G.5](#) of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform. **Due to the scheduling of the final exams, the additional time will be added to the end of the registrar scheduled synchronous exam to support students. This way, your exam schedule accurately reflects the start time of the exam for any synchronous exams. E.g. If a synchronous exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the end time of the synchronous exam. This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9 am and finish at 12pm. - updated April 6, 2021**

#### 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, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

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

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

All Project work in this course relies on data acquired using equipment at the Rothney Astrophysical Observatory. This will be accomplished remotely, via Zoom, in the evening hours after sunset, when weather conditions allow. All students are expected to make every effort to participate in the collection of data, which will be distributed among all students for analysis.

#### 6. Course Materials:

Required Textbook(s):

Frederick R. Chromey, *To Measure the Sky: An Introduction to Observational Astronomy 2nd Ed*: Cambridge.

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:**

By entering into the exams in this course, students are making a declaration that they are working **by themselves**, with only the aid of the course textbook, lecture notes, and other course approved online resources, AND with NO third party tools such as file sharing websites, texting and other communication apps, and services that are not affiliated with the University of Calgary.

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.

- 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
- 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:**

- 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](#)).
- SU Wellness Services:** For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).
- 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](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>)
- 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](#)  
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

- e. **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.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP). 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:** [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).

- 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.

## Addendum

### Course Goals:

It is commonly believed that all astronomers do is use telescopes to make cool images of things in space. But this course teaches students that a fancy picture is not the goal. All we know about the universe; how big stars are and how far away they are and what they are made of and how old they are and how they are born and how they die, and the physical properties of planets and galaxies and the universe - we know because we collect and study the light that arrives at our telescopes and detectors.

The UC's Rothney Astrophysics Observatory is a laboratory filled with the modern tools astronomers use to collect and study light from space, across the electromagnetic spectrum. In this course, students collect data to make measurements. To estimate uncertainty in those measurements students require a solid understanding of the instruments employed, the data analysis process, statistical arguments, and error propagation. After much work a measurement is in hand including its estimated uncertainty, and from that, conclusions are drawn about the

phenomena being studied.

Teamwork:

Students taking this course will learn many of the details involved in this entire process of astronomical investigation and discovery. As students will need to work in small groups to accomplish the long list of tasks they are challenged with in this course, this is an opportunity to hone communication and collaborative skills. Accountability to your teammates is part of the evaluation process. Details of this evaluation process will be discussed in lecture.

Course Learning Incomes:

Students entering this course have taken a math-based introductory astrophysics course, or equivalent. Thus, basic concepts such as the magnitude system, astronomical and geological coordinate systems, telescope optics and mounting systems, observable properties of stars, and the constituents of the solar system and Milky Way galaxy are familiar. Mathematical skills are important at all levels of one's undergraduate pursuits in physics, and this course is no exception. Familiarity in geometry, algebra, and calculus are advantageous skills for students coming into this course.

Syllabus:

A wide range of topics will be discussed in this course. These include, but are not restricted to;

- Brief review of astronomical basics
- Aspects of light and matter
- Measurements, statistics, and uncertainty
- Optics, telescopes, and filters
- CCDs, spectrographs, and other detectors
- Digital image processing

**Course Outcomes:**

- Examine how complex optical systems, from telescopes to spectrographs, function
- Examine how specialized astronomical filters (griz, Johnson, Ha, 1420 MHz) and precision photometric arrays (CCDs), work and are applied to different data acquisition methodology
- Learn and apply fundamental data analysis software tools and techniques to remove instrumental defects and reduce noise.
- Learn and attempt to apply advanced data analysis methods such as image stacking, deconvolution, Fourier transform filtering, etc.
- Gain insight into error analysis and error propagation, quantifying signal to noise ratio, and planning ahead to produce the highest quality data possible in the gathering process
- Become proficient in three keys areas of observational astrophysics; Photometry, Astrometry, and Spectroscopy

Electronically Approved - Apr 06 2021 16:55

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**Department Approval**