

**Carleton University  
Department of Physics**

**PHYS 1902  
From Our Star to the Cosmos  
Sections V**

**Winter 2021**

**Course Outline**

Due to the COVID-19 precautions in place, this course will be offered online only for the Winter 2021 term. The lectures were previously recorded in the Winter 2020 term by Dr. Ken Moast and will be re-broadcast through the Carleton University OnLine (CUOL) Media Space service and CULearn page. All course material will be posted on cuLearn.

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Office hours: Tuesdays and Thursdays, 7:00 p.m. – 7:45 p.m. or by appointment.

Office hours will take place using the Big Blue Button video conferencing system, which is built into cuLearn.

Teaching Assistants: Ming Liu

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Course Website: <https://culearn.carleton.ca/moodle/course/view.php?id=163802>

Textbook: *Astronomy Today*, 9th Edition by Eric Chaisson and Steve McMillan,  
Publisher: Pearson, ISBN: 978-0-13-451631-8.

Welcome to your first (or second) course in astronomy! I hope that you have an enjoyable winter session studying at Carleton. This course is aimed at general interest students who have had minimal exposure to science or mathematics. As such, this course will rely mostly on descriptive explanations employing diagrams and pictures to help build a heuristic understanding of the cosmos.

PHYS 1902 is one of two introductory courses on astronomy offered by Carleton. This course focuses on galaxies and stellar phenomena. In this course, you will learn how stars form and evolve, and detail the methods astronomers and scientists use to learn about the universe on its largest scales. You will also learn how to observe the sky for yourself and you will have the

chance to use your new skills. There would be some virtual observing sessions run by Callan Jessiman who would help us in this course. Callan will set up his telescope and stream live video through it on a YouTube channel that will be created for these events while describing what we're looking at and responding to any questions viewers might have. More details about the observing sessions will be announced at a later date.

By the end of PHYS 1902 you will understand the motions of the sky, how telescopes work, the characteristics and properties of stars, how galaxies form, and how scientists learn about our universe. I hope that you will gain a deeper appreciation of science and astronomy, and have fun while learning!

## **1. Calendar Description**

Starting with the Sun, the course studies its composition and source of power, then compares our Sun with the other stars in the galaxy and beyond. Modern ideas concerning the structure, origin and evolution of the universe, pulsars and supernovae are examined. Precludes additional credit for [PHYS 2203](#).

## **2. Carleton Online**

**Carleton Online website:** <https://carleton.ca/online>

**MediaSpace login page:** <https://mediaspace.carleton.ca>

**Email:** [online@carleton.ca](mailto:online@carleton.ca) (general information)

PHYS 1902 is offered with support from Carleton Online (formerly CUOL: Carleton University OnLine). The lectures were previously recorded in the Winter 2020 term by Dr. Ken Moats and will be re-broadcast for the Winter 2021 term. Recorded lectures can be accessed through the Carleton MediaSpace service and CULearn page.

Due to the COVID-19 precautions in place, all the recorded videos for this course are free of charge for the 2021 Winter Sessions. All students registered in this course will be able to access their lectures from the MediaSpace website and CULearn page.

## **3. Course Modality**

PHYS 1902 is offered as Asynchronous Course. This course is an online course where the instructor and students share information, ideas, and learning experiences in a virtual course space. Asynchronous courses do not have required live, scheduled meetings online. However, students are expected to remain up to date with the deadlines and due dates provided by the instructor. These courses require high-speed Internet access and a computer.

## **4. Textbook**

The required textbook is *Astronomy Today*, 9th Edition by Eric Chaisson and Steve McMillan, Publisher: Pearson, ISBN: 9780134558219.

This is an eTextbook. An access code can be purchased online or at the University Bookstore at the University Centre. Instructions for accessing the eTextbook are posted on the PHYS 1902 cuLearn page.

## **5. Course Components and Marking Scheme**

### a. Marks and passing conditions

The marking scheme is as follows:

Assignments (4 × 10 %)	40 %
Midterm Exam	20 %
Final Exam	40 %
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Course total	100 %

In order to pass the course, your overall grade must be at least 50 %.

As with any university-level course, it is imperative that you attend/view all lectures if you wish to succeed. The course assessment consists of four assignments, a midterm exam, and a final exam. In this section, I explain how each assessment component factors into your final grade.

### b. Lectures

The lectures from the previous year have been recorded to video and will be available online through the MediaSpace service and CULearn page. Each Tuesday and Thursday, 1 additional lecture recordings will become available. Each recording is a traditional lecture, approximately 1 hour and 20 minutes in length.

There are three hours of lectures per week. Refer to Section 6 of this course outline for a detailed schedule of the delivery of the material, as well as for the content and textbook chapters covered every week. The textbook is an important tool to learn scientific material. The book identifies the learning objectives, explains the fundamental concepts and contains several review problems.

Note that the first 10 lectures of PHYS 1901 and PHYS 1902 cover the same material. This is so that any student taking either of these courses can learn the basic laws of physics and astronomy. For students who choose to take both courses, PHYS 1901 and PHYS 1902 cover different topics

starting with lecture 11.

c. Assignments (40%)

There will be four assignments to be completed outside of class. I encourage collaboration with your colleagues on the assignments but I stress that collaboration does not mean copying. Please familiarize yourself with Carleton University's policies regarding plagiarism and academic honesty (you can find these policies in the Undergraduate Calendar and in Section 7 of this course outline). I hope that you will find the assignments thought provoking and fun. Don't worry if at times you get stuck – I will be more than willing to help. Remember, the process of getting unstuck is called learning.

The assignment schedule is as follows:

Assignment	Date Handed Out	Deadline
1	Tuesday, January 19	Tuesday, February 2
2	Tuesday, February 9	Tuesday, February 23
3	Tuesday, February 23	Tuesday, March 9
4	Tuesday, March 16	Tuesday, March 30

**Assignment Submission Policy**

- You must submit your assignments electronically in cuLearn, by uploading a file in **PDF or Microsoft Word format. Do not email your assignment to me or the TA.**
- **Assignments must be submitted no later than 11:59 p.m. Eastern Time on the above due dates.**
- **Late assignments are not accepted under any circumstances and I will assign a grade of zero.** Only under the most serious of circumstances will I exempt a student from an assignment, in which case the remainder of the student's assessment will be reweighted.

d. Midterm Exam (20%)

The midterm exam will be held on **Saturday, February 27, 2020 at 3:00 p.m. – 4:30 p.m. Eastern Time**, and will take place online through cuLearn. The exam will be open-book and consist of multiple choice questions. If you have a legitimate reason for missing the midterm exam, a deferred midterm exam may be scheduled for you. More details about the midterm exam will be announced at a later date.

e. Final Exam (40%)

The Final Exam will be held during the Winter exam period, April 16 – 27, 2021 and will take place online through cuLearn. The date and time of the exam are scheduled by the central University scheduling service and will be announced part of the way through the term. The final exam will be cumulative, open-book, and consist of multiple-choice questions. More details about the exam will be announced at a later date.

f. Deferred Exams

If you miss the Final Exam for a valid reason such as illness, you may apply for a Deferred Exam through the registrar's office. A Deferred Exam replaces only the Final Exam portion of your grade. Deferred Exams for Winter 2021 are scheduled during May 14 – 26, 2021.

Students with significant incomplete term work, such that a failing grade would be awarded regardless of the final exam score, will not be permitted to write a deferred exam.

## **6. Lecture Schedule and Important Dates**

Lecture	Date	Topics	Textbook Sections
1	January 12	Course Introduction Our Place in Space	1.1
2	January 14	Scientific Notation and Units in Astronomy The Scientific Method	Appendices 1, 2 1.2
3	January 19	The Celestial Sphere, Earth's Orbital Motion <b>Assignment 1 Handed Out</b>	1.3 – 1.4
4	January 21	Motion of the Moon, The Measurement of Distance, Ancient Astronomy	1.5 – 1.6
-	January 25	<b>Last day of registration for winter term courses</b>	-
5	January 26	The Copernican Revolution, Planetary Motion	2.1 – 2.5
6	January 28	Laws of Motion	2.6 – 2.8
-	January 31	<b>Last day for a fee adjustment when withdrawing from winter term courses. Withdrawals after this date will result in a permanent notation of WDN appearing on your official transcript</b>	-
7	February 2	Light and Radiation <b>Assignment 1 Due</b>	3.1 – 3.3
8	February 4	Radiation law Spectroscopy	3.4-3.5 4.1-4.2
9	February 9	Spectroscopy Telescopes <b>Assignment 2 Handed Out</b>	4.2-4.5 5.1-5.2
10	February 11	Telescopes	5.3-5.8
-	February 15-19	<b>Winter Break. Classes are suspended.</b>	-
11	February 23	The Sun <b>Assignment 2 Due</b> <b>Assignment 3 Handed Out</b>	16.1-16.7
12	February 25	The Stars	17.1-17.4
-	February 27	<b>Midterm Exam, 3:00 p.m. – 4:30 p.m.</b>	-
13	March 2	The Stars	17.5-17.8

14	March 4	The Interstellar Medium Star Formation	18.1-18.5 19.1-19.3
15	March 9	Star Formation Stellar Evolution of Low-Mass Stars <b>Assignment 3 Due</b>	19.4-19.6 20.1-20.3
16	March 11	Stellar Evolution of High-Mass Stars Stellar Explosions	20.4 – 20.6 21.1 – 21.3
17	March 16	Stellar Explosions, Neutron Stars <b>Assignment 4 Handed Out</b>	21.4 – 21.5 22.1 – 22.4
18	March 18	Relativity and Black Holes	22.5 – 22.8
19	March 23	The Milky Way Galaxy	23.1 – 23.7
20	March 25	Galaxies	24.1 – 24.5
21	March 30	Galaxies and Dark Matter <b>Assignment 4 Due</b>	25.1 – 25.5
22	April 1	Cosmology	26.1 – 26.7
23	April 6	The Early Universe	27.1 – 27.6
24	April 8	Course review, part 1	1 – 5, 16 – 17
25	April 13	Course review, part 2	18-27
-	April 16 – 27	Final examinations in winter term courses may be held. Examinations are normally held all seven days of the week.	-
-	May 14 – 26	Winter term deferred examinations will be held.	-

## **7. University Policies**

### **Grade Definition:**

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90 – 100	B+ = 77 – 79	C+ = 67 – 69	D+ = 57 – 59
A = 85 – 89	B = 73 – 76	C = 63 – 66	D = 53 – 56
A– = 80 – 84	B– = 70 – 72	C– = 60 – 62	D– = 50 – 52
F = <50			

WDN = Withdrawn from the course

ABS = Student absent from final exam

DEF = Deferred (see Section 5f above)

FND = Failed, no Deferred (student could not pass even with 100% on final exam)

### **Academic Regulations, Accommodations, Plagiarism, etc.:**

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

### **Academic Accommodations for Students with Disabilities:**

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at **613-520-6608** or **pmc@carleton.ca** for a formal evaluation. For more information visit: <https://carleton.ca/pmc/>.

If you are already registered with the PMC, contact your PMC coordinator to send your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*).

\*The deadline for contacting the Paul Menton Centre regarding accommodation for final exams for the Fall exam period is **November 13, 2020** and for the Winter exam period is **March 19, 2021**.

### **For Religious Obligations:**

Students requesting academic accommodations on the basis of religious obligation should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event.

Accommodation is to be worked out directly and on an individual basis between the student and the instructor(s) involved. Instructors will make accommodations in a way that avoids academic disadvantage to the student.

Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance. <https://carleton.ca/equity/focus/discrimination-harassment/religious-spiritual-observances/>

### **For Pregnancy:**

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required. <https://carleton.ca/equity/contact/form-pregnancy-accommodation/>

### **Plagiarism:**

Plagiarism is the passing off of someone else's work as your own and is a serious academic offence. For the details of what constitutes plagiarism, the potential penalties and the procedures refer to the section on Instructional Offences in the Undergraduate Calendar.

### **What are the Penalties for Plagiarism?**

A student found to have plagiarized an assignment may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; and/or a reprimand; a refusal of permission to continue or to register in a specific degree program; academic probation; award of an FNS, Fail, or an ABS.

### **What are the Procedures?**

1. All allegations of plagiarism are reported to the Dean of the Faculty of Science. Documentation is prepared by instructors and/or departmental chairs.
2. The Dean writes to the student and the University Ombudsperson about the alleged plagiarism.
3. The Dean reviews the allegation. If it is not resolved at this level then it is referred to a tribunal appointed by the Senate.

Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy (see <https://carleton.ca/registrar/academic-integrity/>). The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the undergraduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension

from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

For any offences committed after January 11, 2021, minimum penalties for violations of the Academic Integrity Policy will be applied as follows:

- First offence, first-year students (< 4.0 credits completed): No credit for the assignment or activity in question, or a final grade reduction of one full letter grade (e.g., A- becomes B-, if reduction results in an F, so be it), whichever penalty is more severe.
- First offence (everyone else): F in the course
- Second offence: One-year suspension from program
- Third offence: Expulsion from the University

Note: these are minimum penalties. More severe penalties will be applied in cases of egregious offences (e.g., a first-year student accessing cuLearn from their phone during an exam will be given an F in the course; bribing a faculty member or a TA for a better grade would be grounds for suspension, etc.)

If you are unsure of the expectations regarding academic integrity (how to use and cite references, how much collaboration with lab- or classmates is appropriate), ASK your instructor or your TA. It is NEVER okay to upload assignments to online sites such as Chegg, CourseHero, OneClass, etc.

Failure to inform yourself of the expectations regarding academic integrity is not a valid excuse for violations of the policy.

### **Assistance for Students:**

- Academic and Career Development Services: <https://carleton.ca/career/>
- Writing Services: <http://www.carleton.ca/csas/writing-services/>
- Peer Assisted Study Sessions (PASS): <https://carleton.ca/csas/group-support/pass/>
- Math Tutorial Centre: <https://carleton.ca/math/math-tutorial-centre/>
- Science Student Success Centre: <https://sssc.carleton.ca/>

### **Important Information:**

- Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).
- Students must always retain a hard copy of all work that is submitted.

- Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.
- Carleton University is committed to protecting the privacy of those who study or work here (currently and formerly). To that end, Carleton's Privacy Office seeks to encourage the implementation of the privacy provisions of Ontario's *Freedom of Information and Protection of Privacy Act* (FIPPA) within the university.
- In accordance with FIPPA, please ensure all communication with staff/faculty is via your Carleton email account. To get your Carleton Email you will need to activate your MyCarletonOne account through Carleton Central. Once you have activated your MyCarletonOne account, log into the MyCarleton Portal.

## **8. Important Dates**

### **Winter 2021**

- January 6 University reopens at 8:30 am.
- January 11 Winter term classes begin.
- January 25 Last day for registration and course changes in Winter term classes.
- January 22-24, 29-31 Fall term deferred examinations will be written.
- January 31 Last day for a fee adjustment when withdrawing from Winter term courses or the Winter portion of two-term courses (financial withdrawal). Withdrawals after this date will create no financial change to Winter term fees and will result in a grade(s) of WDN appearing on your official transcript.
- February 12 April exam schedule available online.
- February 15 Statutory Holiday. University closed.
- February 15-19 Winter Break, no classes.
- March 19 Last day to request formal exam accommodations for April examinations to the Paul Menton Centre for Students with Disabilities. Late requests will be considered on case-by-case basis.
- March 31 Last day for summative or final examinations in Winter term courses before the official examination period.
- April 2 Statutory holiday. University closed.
- April 14 Winter term ends. Last day of Fall/Winter and Winter term classes. Last day for academic withdrawal from Fall/Winter and Winter term courses. Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for Fall/Winter and Winter term courses.
- April 15 No classes or examinations take place.
- April 16-27 Final Examinations. Exams are normally held all seven days of the week.
- April 27 All take-home examinations for courses below the 4000 level are due.
- May 14-26 Fall/Winter and winter term deferred final examinations will be held.
- May 24 Statutory holiday. University closed. No examinations take place.