

**Carleton University  
Department of Physics**

**PHYS 1901  
Planetary Astronomy  
Sections A & T**

**Fall 2020**

**Course Outline**

Due to the COVID-19 precautions in place, this course will be offered online only for the Fall 2020 term. The lectures were previously recorded in the Fall 2019 term and will be re-broadcast through the Carleton University OnLine (CUOL) Video On Demand (VOD) service. 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: Callan Jessiman [CallanJessiman@email.carleton.ca](mailto:CallanJessiman@email.carleton.ca)  
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Course Website: <https://culearn.carleton.ca/moodle/course/view.php?id=152439>

Textbook: *Astronomy Today*, 9th Edition by Eric Chaisson and Steve McMillan,  
Publisher: Pearson, ISBN: 9780134873787

Welcome to your first (or second) course in astronomy! I hope that you have an enjoyable fall 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. However, studying astronomy also requires a basic understanding of the laws of physics, which requires some use of high school level mathematics.

PHYS 1901 is one of two introductory courses on astronomy offered by Carleton (the other being PHYS 1902: *From Our Stars to the Cosmos*). PHYS 1901 focuses on the solar system and planetary phenomena. By the end of this course you will understand the motions of the sky, how telescopes work, the characteristics of the planets, how the solar system formed, and the methods astronomers and scientists use to learn about our neighbourhood in the Universe. I hope that you will gain a deeper appreciation of science and astronomy, and have fun learning!

## **1. Calendar Description**

Description of the known stellar, galactic and extra-galactic systems together with the instruments used to study them. Modern ideas concerning the structure, origin and evolution of our own planet. Formation of the Moon-Earth system. Study of the planets in our solar system. Precludes additional credit for PHYS 2203.

## **2. Carleton University OnLine (CUOL)**

**CUOL website:** [www.carleton.ca/cuol](http://www.carleton.ca/cuol)

**Video On Demand login page:** <https://vod.cuol.ca/vod>

**CUOL Student Centre:** D299 Loeb, 613-520-4055

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

Email: [vod@carleton.ca](mailto:vod@carleton.ca) (Video On Demand support and questions)

PHYS 1901 is offered through Carleton University OnLine (CUOL). The lectures have been previously recorded in the Fall 2019 term and will be re-broadcast for the Fall 2020 term. CUOL course lectures can be accessed through the CUOL Video On Demand (VOD) service, which offers online streaming/downloading of available lectures at any time.

Due to the COVID-19 precautions in place, CUOL will be waiving Video On Demand (VOD) fees for the 2020 Fall Sessions. All students registered in CUOL (T and V section) courses will be able to access their lectures from the CUOL VOD website. Login with your MyCarletonOne password at <https://vod.cuol.ca/vod>.

## **3. Textbook**

The required textbook is *Astronomy Today*, 9th Edition by Eric Chaisson and Steve McMillan, Publisher: Pearson, ISBN: 9780134873787.

This is an eTextbook. An access code can be purchased online on the publisher's website or at the University Bookstore. Instructions for accessing the eTextbook are posted on the PHYS 1901 cuLearn page.

## **4. 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 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**

There are three hours of lectures per week. Refer to Section 5 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 the 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 written 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 6 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:

<b>Assignment</b>	<b>Date Handed Out</b>	<b>Deadline</b>
1	Thursday, September 17	Thursday, October 1
2	Thursday, October 8	Thursday, October 22
3	Thursday, October 22	Thursday, November 5
4	Thursday, November 12	Thursday, November 26

### **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, November 7, 2020 at 9:00 a.m. – 10:30 a.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 examination will be held during the Fall exam period, December 12 – 23, 2020, and will take place online through cuLearn. The date and time of the exam is 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 Fall 2020 are scheduled during January 22 – 24 and 29 – 31, 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.

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

Lecture	Date	Topics	Textbook Sections
1	September 10	Course Introduction Our Place in Space	1.1
2	September 15	The Scientific Method Scientific Notation and Units in Astronomy	1.2, Appendices 1, 2
3	September 17	The Celestial Sphere, Earth's Orbital Motion <b>Assignment 1 Handed Out</b>	1.3 – 1.4
4	September 22	Motion of the Moon, The Measurement of Distance Ancient Astronomy	1.5 – 1.6 2.1
-	September 23	<b>Last day of registration for fall term courses</b>	-
5	September 24	The Copernican Revolution Planetary Motion	2.2 – 2.6
6	September 29	Laws of Motion	2.7 – 2.8
-	September 30	<b>Last day to withdraw from fall term and fall/winter courses with a full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript</b>	-
7	October 1	Light and Radiation <b>Assignment 1 Due</b>	3.1 – 3.3
8	October 6	Thermal Radiation, The Doppler Effect	3.4 – 3.5

		Spectral Lines	4.1
9	October 8	Spectroscopy <b>Assignment 2 Handed Out</b>	4.2 – 4.5
10	October 10	Telescopes	5.1 – 5.4
11	October 13	Radio and Space-Based Telescopes Overview of the Solar System	5.5 – 5.8 6.1 – 6.2
12	October 15	The Solar System and its Formation	6.3 – 6.7
13	October 20	Earth	7.1 – 7.5
14	October 22	The Moon <b>Assignment 2 Due</b> <b>Assignment 3 Handed Out</b>	7.6, 8.1 – 8.9
-	October 26– 30	<b>Fall Break. Classes are suspended.</b>	-
15	November 3	Mercury Venus	8.1 – 8.9 9.1 – 9.4
16	November 5	Venus Mars <b>Assignment 3 Due</b>	9.5 – 9.6 10.1 – 10.5
-	November 7	<b>Midterm Exam, 9:00 a.m. – 10:30 a.m.</b>	-
17	November 10	Mars Jupiter	10.6 – 10.8 11.1 – 11.2
18	November 12	Jupiter and its Moons <b>Assignment 4 Handed Out</b>	11.3 – 11.6
19	November 17	Saturn	12.1 – 12.5
20	November 19	Uranus and Neptune	13.1 – 13.6
21	November 24	Solar System Debris	14.1 – 14.4
22	November 26	Exoplanets <b>Assignment 4 Due</b>	15.1 – 15.5
23	December 1	The Sun	16.1 – 16.7

24	December 3	Course review	1 – 6
25	December 8	Course review	7 – 16
-	December 11	<b>Last day for academic withdrawal from fall term courses.</b>	-
-	December 12 – 23	Final examinations in fall term courses may be held. Examinations are normally held all seven days of the week.	-
-	January 22 – 24 and 29– 31	Fall term deferred examinations will be held	-

## 6. 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 4f 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 deadlines 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 12, 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 6, 2020, 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.

## **7. Important Dates**

### **FALL 2020**

September 7	Statutory Holiday. University Closed.
September 9	Classes begin.
September 18-20	Full and late summer term deferred final examinations to be held.
September 23	Last day of registration for fall term and fall/winter courses.  Last day to change courses or sections (including auditing) for fall term and fall/winter courses.
September 30	Last day to withdraw from fall term and fall/winter courses with a full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
October 9	December examination schedule (fall term final and fall/winter mid-terms) available online.
October 12	Statutory Holiday. University closed.
October 15	Last day for receipt of applications for admission to an undergraduate degree program for the Winter term from applicants whose documents originate from outside Canada or the United States.
October 26-30	Fall break, no classes.
November 13	Last day to request Formal Examination Accommodation Forms for December examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
November 15	Last day for receipt of applications for admission to an undergraduate degree program for the winter term.
November 27	Last day for summative tests or examinations - or for formative and/or practical tests or examinations totaling more than 15% of the final grade - before the official examinations period (see examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
December 1	Last day for receipt of applications from potential Winter (February) graduates.
December 11	Fall term ends. Last day of fall-term classes. Classes follow a Monday schedule.

Last day for academic withdrawal from fall term courses.

Last day for take-home examinations to be assigned, with the exception of those conforming to the examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.

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 term courses.

Last day for receipt of applications for undergraduate degree program transfers for winter term

December 12-23	December exams: Final examinations for Fall courses, mid-terms for Fall/Winter courses. Exams are normally held all seven days of the week.
December 23	All take-home examinations are due on this day, with the exception of those conforming to the examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.
December 25 – January 1	University closed.

### **WINTER 2021**

January 4	University reopens.
January 6	Winter term classes begin.
January 20	Last day for registration and course changes in Winter term classes.  Last day to change courses or sections (including auditing) for winter term courses.
January 22-24, 29-31	Fall term deferred examinations will be written.
January 31	Last day for withdrawal from winter term and winter portion of fall/winter courses with full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
February 1	Last day for receipt of applications for admission to the Bachelor of Social Work degree program for the Fall/Winter session.
February 12	April exam schedule available online.

February 15	Statutory Holiday. University closed.
February 16-19	Winter Break, no classes.
March 1	<p>Last day for receipt of applications to Bachelor of Architectural Studies, Bachelor of Humanities, Bachelor of Industrial Design, Bachelor of Information Technology (Interactive Multimedia and Design), Bachelor of Journalism, Bachelor of Journalism and Humanities, and the Bachelor of Music degree programs for the fall/winter session.</p> <p>Last day for receipt of applications for admission to an undergraduate program for the summer term.</p> <p>Last day for receipt of applications for admission from candidates who wish to be guaranteed consideration for financial assistance (including Carleton fellowships, scholarships and teaching assistantships) administered by Carleton University. Candidates whose applications are received after the March 1 deadline may be considered for the award of a fellowship, scholarship or teaching assistantship (Graduate students only).</p>
March 12	Last day to request formal exam accommodations for April examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
March 26	Last day for summative tests or examinations - or for formative and/or practical tests or examinations totaling more than 15% of the final grade - before the official examination period (see Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar).
April 1	<p>Last day for receipt of applications for admission to an undergraduate program for the fall/winter session from candidates whose documents originate outside Canada or the United States, except for applications due February 1 or March 1.</p> <p>Last day for receipt of applications from potential spring (June) graduates.</p>
April 2	Statutory holiday. University closed.
April 9	<p>Winter term ends.</p> <p>Last day of fall/winter and winter term classes.</p> <p>Last day for take-home examinations to be assigned, with the exception of those conforming to the Examinations regulations in the Academic</p>

Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.

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 10 No classes or examinations take place.
- April 11-23 Final Examinations. Exams are normally held all seven days of the week.
- April 23 All take-home examinations are due on this day, with the exception of those conforming to the Examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/General Regulations of the Graduate Calendar.
- May 1 Last day for receipt of applications for undergraduate internal degree transfers to allow for registration for the summer session.
- May 14-26 Fall/Winter and winter term deferred final examinations will be held.
- June 1 Last day for receipt of applications for admission to an undergraduate program for the fall/winter session except for application due February 1 or March 1 or April 1.
- June 15 Last day for receipt of applications for undergraduate degree program transfers for the fall term.