

**Carleton University
Department of Physics**

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

Summer 2020

Course Outline

Due to the COVID-19 precautions in place, this course will be offered online only for the Summer 2020 term. The lectures were previously recorded in the Winter 2020 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.

Instructor: Dr. Ken Moats
Email: kenneth.moats@carleton.ca

Office hours: Tuesdays and Thursdays, 8:00 p.m. – 9:00 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: TBA

Course Website: <https://culearn.carleton.ca/moodle/course/view.php?id=152442>

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 summer 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 1902 is one of two introductory courses on astronomy offered by Carleton (the other being PHYS 1901: *Planetary Astronomy*). PHYS 1902 focuses on galaxies and stellar phenomena. By the end of this course you will understand the motions of the sky, how telescopes work, the properties of stars and how they form and evolve, how galaxies form, and the methods astronomers and scientists use to learn about the universe on its largest scales. 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 University OnLine (CUOL)

CUOL website: 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 (general information)

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

PHYS 1902 is offered through Carleton University OnLine (CUOL). The lectures have been previously recorded in the Winter 2020 term and will be re-broadcast for the Summer 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 Summer 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: 978-0-13-451631-8.

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 1902 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

The lectures from the previous year have been recorded to video and will be available online through the VOD service. At the beginning of each week, 4 additional lecture recordings will become available. Each recording is a traditional lecture, approximately 1 hour and 20 minutes in length.

Refer to Section 5 of this course outline for a detailed schedule of the delivery of the material, including 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:

Assignment	Date Handed Out	Deadline
1	Tuesday, July 7	Tuesday, July 14
2	Wednesday, July 15	Wednesday, July 22
3	Tuesday, July 28	Tuesday, August 4
4	Wednesday, August 5	Wednesday, August 12

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 **Monday, July 27, 2020 at 7:00 p.m. – 8:30 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 examination will be held during the Late Summer exam period, August 17 – 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 the Late Summer term are scheduled during September 18 – 20, 2020.

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

Week Beginning	Lecture	Topics	Textbook Sections
July 2	1	Course Introduction Our Place in Space	1.1
	2	Scientific Notation, Astronomical Measurement The Scientific Method	Appendices 1, 2 1.2
July 6	3	The Celestial Sphere, Earth’s Orbital Motion	1.3 – 1.4
	4	Motion of the Moon, The Measurement of Distance	1.5 – 1.6
	5	The Measurement of Distance The Copernican Revolution, Planetary Motion	1.6 2.1 – 2.5
	6	Laws of Motion, Newtonian Mechanics	2.6 – 2.8
July 13	7	Light and Radiation, The Electromagnetic Spectrum	3.1 – 3.3
	8	Radiation Laws Spectroscopy	3.4 – 3.5 4.1 – 4.2
	9	Spectroscopy Telescopes	4.2 – 4.5 5.1
	10	Telescopes	5.2 – 5.8

July 20	11	The Sun	16.1 – 16.7
	12	The Stars	17.1 – 17.4
	13	The Stars	17.5 – 17.8
	14	The Interstellar Medium Star Formation	18.1 – 18.5 19.1 – 19.3
July 27	15	Star Formation Stellar Evolution of Low-Mass Stars	19.4 – 19.6 20.1 – 20.3
	16	Stellar Evolution of High-Mass Stars Stellar Explosions	20.4 – 20.6 21.1 – 21.3
	17	Stellar Explosions Neutron Stars	21.4 – 21.5 22.1 – 22.4
	18	Relativity and Black Holes	22.5 – 22.8
August 3	19	The Milky Way Galaxy	23.1 – 23.7
	20	Galaxies	24.1 – 24.5
	21	Galaxies and Dark Matter	25.1 – 25.5
	22	Cosmology	26.1 – 26.7
August 10	23	The Early Universe	27.1 – 27.6
	24	Course Review, Part 1	1 – 5, 16 – 17
	25	Course Review, Part 2	18 – 27
August 17 – 23	-	Final examinations in Late Summer term courses may be held. Examinations are normally held all seven days of the week.	-
September 18 – 20	-	Late Summer 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 Early Summer exam period is **May 29, 2020** and for the Late Summer exam period is **July 24, 2020**.

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

Summer Sessions:

- **Early Summer:** May 4, 2020 to June 16, 2020
- **Late Summer:** July 2, 2020 to August 14, 2020
- **Full Summer:** May 4, 2020 to August 14, 2020

March 1	Last day for receipt of applications for admission to an undergraduate degree program for the summer term.
March 18	Financial holds preventing registration will be applied to accounts with an outstanding balance. In order to prevent delayed registration for Summer 2020 courses, please allow adequate processing time as payments normally take 2 days to be applied to your student account.
April 16	Carleton Central opens at 8:30 a.m. for registration for Carleton University degree students (graduate and undergraduate). Check your time-ticket here .
April 20	Carleton Central opens at 8:30 a.m. for registration for Carleton University Special Students (non-degree).
April 27	Registration for University of Ottawa undergraduate exchange students begins. Registration opens at 8:30 a.m.
May 1	Last day for receipt of applications for undergraduate internal degree transfers to allow for registration for the summer term.
May 4	Early summer and full summer courses begin.
May 11	Last day for registration and course changes (including auditing) for early summer courses.
May 15	Last day for registration and course changes (including auditing) for full summer courses.
May 15 – 27	Fall/Winter and winter term deferred final examinations will be held.
May 18	Statutory holiday. University closed.
May 22	Last day for a full fee adjustment when withdrawing from early summer and full summer courses (financial withdrawal). Withdrawals after this date will result in a permanent notation of WDN on the official transcript.

- May 29** Last day to request Formal Examination Accommodation for **early** summer examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfill accommodation requests received after the specified deadlines.
- June 9** Last day for summative tests or examinations, or formative tests or examinations totalling more than 15% of the final grade for **early** summer courses before the official examination period (see [Examination Regulations](#) in the Academic Regulations of the University section of the Undergraduate Calendar).
- June 12** Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in Spring 2020 and must register for the Summer 2020 term.
- June 16** Last day of **early** summer classes (NOTE: Full summer classes resume July 2).
Last day for academic withdrawal from **early** summer courses.
Last day for handing in term assignments, subject to any earlier course deadline.
- June 17 – 18** No classes or examinations take place.
- June 19 – 25** Early summer final examinations and mid-term examinations in full summer courses may be held. Examinations are normally held all seven days of the week.
- June 24** Final summer term payment deadline. Any balance owing on your student account will prevent access to registration for future terms.
Holds will be placed on unpaid summer accounts, which will prevent access to marks and/or registration for the 2020-21 Fall/Winter course selection. Payment of fees is due by the [posted deadlines](#).
- July 1** Statutory holiday. University closed.
- July 2** **Late** summer courses begin.
Full summer courses resume.
- July 9** Last day for registration and course changes (including auditing) for **late** summer courses.
- July 17** Last day for a full fee adjustment when withdrawing from late summer courses (financial withdrawal).
- July 17 – 19** **Early** summer term deferred final examinations to be held.

July 24	Last day to request Formal Examination Accommodation for August examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfill accommodation requests received after the specified deadlines.
August 1	Last day for graduate students to submit their supervisor-approved thesis, in examinable form to the department.
August 3	Civic holiday. University closed.
August 7	Last day for summative tests or examinations, or formative tests or examinations totalling more than 15% of the final grade for late summer and full summer courses before the official examination period (see Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar).
August 14	Summer term financial holds preventing access to grades through Carleton Central and the release of official documents will be applied to accounts with an outstanding balance. Last day of late summer and full summer classes. Classes follow a Monday schedule. Last day for academic withdrawal from late summer and full summer courses and any other courses that end this term. Last day for handing in term assignments, subject to any earlier course deadline.
August 15 – 16	No classes or examinations take place
August 17 – 23	Final examinations in late summer and full summer courses may be held. Examinations are normally held all seven days of the week.
August 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.
September 18 – 20	Late summer and full summer term deferred final examinations will be held.