

ASTR 201: Cosmology

Spring 2021 – Section 001

TTh 2-3:15 pm

Dr. Don McCarthy

Syllabus

Let's Work Together!

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Let's Work Together!

We all know there's a global pandemic right now and we are all affected in different ways. So, if you tell me, you're having difficulty of any sort, I will easily accept that and find a way to move forward. Similarly, I hope you will be as kind to me. Here's what I can offer in this course:

1. You are never obligated to provide personal information about your health, etc.
2. You are always welcome to talk with me about anything you're going through.
3. If I can't help directly, I will do my best to find someone who can.
4. If you need more help, must miss class, or need more time, just ask and we'll work together.

I. Contact and User Information

Professor

Dr. Don McCarthy

Email: mccarhd@email.arizona.edu

Office: Steward Observatory, room N404. Ride the main elevator up to the fourth floor and look straight ahead.

Office hours: MW (2-4 pm) and by appointment

Availability: **any** time. Please (!) do not hesitate to contact me.

Graduate Teaching Assistant Mr. Yujing Qi

Email: qinyj@email.arizona.edu

Office: room 201F in Steward Observatory

Office hours: to be determined

Zoom

Update your Zoom client to version 5.4.7 (released December 21):

<https://support.zoom.us/hc/en-us/articles/201362233-Upgrade-update-to-the-latest-version>

Always use your UA credentials to log in for class:

<https://it.arizona.edu/documentation/how-join-zoom-meeting-required-authentication>

Links, Settings, Times

For reminders via texts: Send @astr201 to 81010

Class D2L Web site: <https://d2l.arizona.edu/d2l/home/994281>

Lecture recordings: available on our D2L site under the "Content" tab

Think Tank tutoring: to be determined

Nighttime observing: on nights to be announced between sunset and ~8:30 pm

II. Course Overview

ASTR 201 is a three credit, general education course at the Tier II level intended for students with prior university background in science at the Tier I level. Our course focuses on understanding (not memorizing) the physical processes at work in the Universe and on building an awareness of how science influences daily life. We will also use the subject of astronomy to improve skills with numbers, in communication (written and oral), and in problem solving. The University's expected Learning Outcomes are summarized here:

<https://catalog.arizona.edu/policy/undergraduate-student-learning-outcomes>

Expected Learning Outcomes:

Upon completion of this course, students will be able to:

1. understand the nature and application of physical science;
2. apply ideas and processes beyond the classroom;
3. recognize the complexity of many scientific issues;
4. speak and write about scientific knowledge;

5. appreciate the relative scale of objects, rates of change, linear and nonlinear growth;
6. critically analyze and interpret data and results presented in tables, graphs and charts as well as perform appropriate mathematical calculations;
7. read and understand scientific literature from popular sources such as magazines and newspapers;

Expectations: Each student is expected to come prepared for every scheduled class. As a general rule, students should invest ~3 hours per credit unit outside of class on homework assignments (i.e., ~9 hours per week), preferably starting each assignment well ahead of the due date. During class, students should participate actively in problem-solving discussions with their peers. Students are always expected to present logically organized, legible solutions and to write clear sentences and paragraphs using good English grammar.

Content: Classes will emphasize hands-on measurement and observational skills. This “follow the evidence” approach will help develop problem-solving skills and reinforce understanding of the scientific method. Reading assignments will be posted before class. Lectures will supplement and expand upon the required reading using PowerPoint, digital animations, videos, music, laboratory equipment, and liquid nitrogen as teaching tools.

Equipment and Software Requirements: You will need daily access to the following hardware:

1. A computer equipped with microphone (and, if possible, a Web camera);
2. Regular access to reliable Internet signal;
3. “Zoom” software (v. 5.4.7) on your computer;
4. Ability to download and run the following software: Web browser, Microsoft Word, PDF file reader. FREE software is available to students via this link:
<https://softwarelicense.arizona.edu/students>

International Students: This course aims to help you to improve proficiency in English writing and speech. You are strongly encouraged to work with American students and the leaders of this course, both during and outside of, class. Also, the Center for English as a Second Language ([CESL](#)) provides opportunities, both day and night, to help you improve your writing skills, oral communication, and grammar. They also offer tutoring opportunities. The *Daily Skills* on our Web site will also help you improve.

“Daily Skills”: Students are expected to write clear sentences and paragraphs using good English grammar for all assignments and exams. Each class period is associated with a suggested basic “Daily Skill” in communication and numerical thinking. Dr. McCarthy recommends that you read these skills regularly and put them into practice throughout our course. Both sets of *Daily Skills* are located in the Content section of our Web site.

III. Simple Guidelines to Earn Your “A”

To be most successful, each student should set a personal goal of achievement and

1. Read directions carefully.
2. Think about material instead of just memorizing it.
3. Attend every class.
4. Start homework early by reading each assignment as soon as it is posted. Your mind will then be prepared to pick up on hints and examples presented in class.
5. Apply each of the *Daily Skills* (numerical and communication) as they accumulate.
6. Proofread your work carefully to avoid careless errors.
7. Ask questions!
8. Seek help whenever needed by asking questions in class, attending office hours and study sessions, or by making an appointment.

IV. Classes

Times: Tuesdays and Thursdays from 2-3:15 pm. Class will begin promptly at 2 pm. Dr. McCarthy will usually begin each Zoom session ~1:30 pm, and end ~3:30 pm, so we can interact informally before, and after, class. Dr. McCarthy also shows interesting videos, images, and puzzles before class.

The University has replaced Spring Break with the following “Reading Days.” On these days, classes will not meet:

Thursday February 25
Tuesday & Wednesday March 9 & 10
Friday & Wednesday April 2 & 21

Locations: Our class is designated as “Re-Entry Stage 3,” so we will meet remotely via Zoom until the University notifies us that in-person meetings may commence. To access class sessions and office hours, simply use the Zoom links posted on our D2L “Calendar.”

When the COVID-19 situation permits teaching on campus, you will be notified via D2L, and we will then meet in the auditorium (N210) of Steward Observatory.

“Zoom”:

Please update the version of Zoom on your computer so we can all use the same features. The latest version (5.4.7) can be found here, along with instructions for updating:

<https://support.zoom.us/hc/en-us/articles/201362233-Upgrade-update-to-the-latest-version>

Our Zoom sessions are “authenticated,” so you must use your University credentials to login as described in item #2 in these Zoom Help Pages:

<https://help.d2l.arizona.edu/content/students-zoom-d2l>

Attendance:

If you feel sick or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel. Notify Dr. McCarthy if you will be missing a class session.

[Campus Health](#) is testing for COVID-19. Please call (520) 621-9202 before you visit in-person. Visit the [COVID-19](#) page for regular updates.

Behavior:

Physical distancing is required in our classroom:

During our in-person class meetings, we will respect CDC guidelines, including restricted seating to increase physical distancing. Any student who does not maintain physical distance from others may be asked to leave the learning space immediately. Noncompliance may result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied.

Face coverings are required in our classroom:

Per UArizona’s [Administrative Directive](#), face coverings that cover the nose, mouth, and chin are required to be worn in all learning spaces at The University of Arizona (e.g., in classrooms, laboratories, and studios). Any student who violates this directive will be asked to leave the learning space immediately and will be allowed to return only when wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied. The student will not be able to return to the learning space until the matter is resolved.

The [Disability Resource Center](#) (DRC) is available to explore [face coverings and accessibility considerations](#) if you believe that your disability or medical condition precludes you from utilizing any face covering or mask option. DRC will explore the range of potential options as well as remote course offerings. Should DRC determine an accommodation to this directive is reasonable, DRC will communicate this accommodation with your instructor.

Recordings of each class can be accessed from our D2L site under the Content tab. These recordings consist of audio plus video of all content during the class session in both Zoom and Panopto formats.

Students are strongly encouraged, but not required, to enable their video connection during every class. Students will not be identified by name according to mandated [FERPA Privacy Protections](#).

Students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies are subject to suspension or civil action.

V. Communications

Email: We will use our official University email addresses for communications. When you email the instructors, be sure to **identify yourself by name** and to **use an appropriate subject line including the term “ASTR 201.”** For example: “ASTR 201: Question about lecture”. Otherwise, your messages may not be read and a response will be delayed.

To sign up for communicating via texts (Remind.com): Send @astr201 to 81010

VI. D2L

Allowable file formats: Not all file formats are supported in D2L. For example, D2L does not recognize HEIC, PAGES, or links to Google Docs. Instead, please use .doc or .pdf formats. At the bottom of this link is a list of compatible formats:

https://documentation.brightspace.com/EN/le/assignments/learner/assignments_intro_1.htm

VII. Textbooks

Our course uses the following three books. Used versions and other editions are acceptable.

Item #1. The first book is "*A Briefer History of Time*" (ISBN 978-0-553-38546-5) written by Stephen Hawking and Leonard Mlodinow. Stephen Hawking is a famous scientist working to understand the Universe and black holes. Since 1988, his books have been best-sellers. There are multiple ways to acquire the book online such as Amazon for ~\$14. Used copies may be available in the University's Bookstore.

Item #2. The second book is "*Cosmology for the Curious*" (ISBN 978-3-319-57039-9) written by D. Perlow and A. Vilenkin. This book is available as a free eBook (courtesy of the UA Libraries) at the link below and is also linked to our D2L Web site under "Library Tools."

<http://ezproxy.library.arizona.edu/login?url=https://link.springer.com/book/10.1007%2F978-3-319-57040-2>

Item #3. A free, online textbook ("*Astronomy*") is available online at the link below and also in Web view and PDF format. You can also purchase a print version via [OpenStax](#) on [Amazon.com](#). The Web view is recommended, and the responsive design works seamlessly on any device. If you buy via Amazon, make sure you use the following link so you get the official OpenStax print version. (Simple printouts sold by third parties on Amazon are not verifiable and not as high-quality.)

<https://openstax.org/details/astronomy>

VIII. Assignments and Exams

“**Doodle Worksheets**” are a required component of our course and are a major form of participation during each class. Your written responses and annotations will help you (1) assess your understanding, (2) enable you to participate in team problem solving, and (3) help you take good notes to prepare for exams. Students are strongly encouraged to include drawings, notes, and feedback to the instructor.

Before each class, you should download the day’s file using the “Doodle Worksheet” tab on our D2L Web site. During class, you will answer the questions we cover in class. After class, please upload your completed sheet to the Assignments tab on D2L. If possible, please use these file formats: .doc or .pdf. You are also welcome to upload a cell phone image of your worksheet but D2L will not recognize .HEIC format.

The “Kami” app (<https://www.kamiapp.com/>) has been popular and enables you to annotate your worksheet conveniently and export in .pdf format.

Homework assignments are a major, required component (30%) of this course and will emphasize skills in numeracy and writing. These assignments will reinforce and apply concepts and will improve your capabilities with numbers and writing throughout the semester using the “*Daily Skills*.” Typically, the daily homework will prepare you to understand the next day’s lecture material and to collaborate with other students on related activities during class.

Occasional “Reaction Paper” essays are meant to engage you in specific topics and to enable you to express your opinions and interpretations in a coherent process once you understand the particular concept. These essays will be graded according to the rubric used in the Writing Program of the Dept. of English: Content (50%), Organization (20%), Expression (20%), Mechanics (10%).

You must adhere to the policies about Academic Integrity and about Teamwork in Section VIII!

The following **rules** apply to all homework assignments:

1. All homework must be typewritten. Math symbols and calculations may be handwritten but must be legible.
2. Homework is due at the start of class on the specified date. If an assignment is turned in late, a **late-penalty** of 15% will be assessed for each class period that has elapsed since the due date. Assignments will not be accepted after two subsequent classes.
3. You must always **SHOW** or explain **HOW** you reached a solution by recording intermediate steps in a calculation or describing your solution logically in words. Simply listing an answer is not acceptable and will not receive any points.
4. Some assignments require your opinion to be clearly stated, so your grade will be determined more by your reasoning and writing abilities than by the exact answer.
5. **Teamwork Policy:** You may **START** an assignment in a team. However, after deciding **HOW** to approach a problem, **you must then make all your own measurements, graphs, and tables and always use your own wording to interpret and express conclusions.** Homework solutions that appear identical are a violation of the Code of Academic Integrity and will receive a grade of zero plus potential expulsion from the course.

Exams:

There will be two in-class exams (Feb 18, April 1, and a Final Exam (May 10, 3:30-5:30 pm). The two-hour final exam will emphasize the last third of the course. The last two exams will provide

"Resurrection Points" for students to earn back points lost in previous exams. There will be NO makeup exams except in cases of extreme difficulty such as a proven illness.

All exams will feature a scratch-test format that allows you to continue answering a question until you answer correctly. The number of points awarded decreases with each attempt. Typically, this format improves your grade by 10%, i.e., a full letter-grade. Most questions will be multiple-choice but each exam will include at least one short-answer essay question.

ALL exams will be CLOSED-BOOK and CLOSED-NOTES.

You are encouraged to use a handwritten, double-sided page of notes ("crib sheet") during each exam. Exams will emphasize understanding instead of memorization.

Here is a link to the University's Final Exam Schedule and regulations:
<https://www.registrar.arizona.edu/courses/final-examination-schedule-fall-2019?audience=students&cat1=10&cat2=31>

IX. Getting Help

Office Hours: See Section I for details. Feel free to suggest other times and make appointments!

Tutoring: The "[Think Tank](#)" offers tutoring for astronomy. Location and time will be announced.

Preceptors are highly motivated students who wish to help teach their peers under the supervision of the course instructor. Often students learn best from other students and preceptors can really "make a difference." As a preceptor in this course you would take an active role in the teaching process by working directly with Dr. McCarthy. You would also receive University credit by enrolling in PTYS 197a (<http://teachingteams.arizona.edu/?q=preceptor/howto>) and completing several workshop sessions with other University preceptors to learn and practice skills in effective teaching. If you would like to become a preceptor, please contact Dr. McCarthy and also learn about the Teaching Teams Program (<http://teachingteams.arizona.edu/>).

Lecture recordings of each class can be accessed from our D2L site under the Content tab. These recordings consist of audio plus video of the main screen but not of any demonstrations.

Preparing for Exams: Interactive review sessions will be held one or more days ahead of each exam to provide an opportunity to ask questions and to practice concepts presented during the course. A study guide and sample questions will be posted to help you prepare for exams.

Academic Advising: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the [Advising Resource Center](#) can guide you toward university resources to help you succeed.

Life Challenges: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The [Dean of Students Office](#) can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.

Physical and Mental-health Challenges: If you are facing physical or mental health challenges this semester, please note that [Campus Health](#) provides quality medical and mental health care. For medical appointments, call (520-621-9202). For After Hours care, call (520) 570-7898. For the [Counseling & Psych Services](#) (CAPS) 24/7 hotline, call (520) 621-3334.

Food Insecurity: Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona [Campus Pantry](#) is open for students to receive supplemental groceries at no cost. Please see their Web site for open times or email them at uofacampuspantry@gmail.com.

X. Grading

Content Deadline:

Except for the Final Exam all assignments are due on the last day of class (May 5).

Course Grade: Students have two options for calculating their semester grade if you consult with Dr. McCarthy by February 4. Grades will be derived from the following categories with the indicated percentage weights.

OPTION #1 (Default):

Homework assignments (30%)

Three exams, including the Final Exam (10% each)

In-class work: Doodle Worksheets, Zoom responses, collaborative activities, etc. (30%)

Other participation (see below) (10%)

OPTION #2 (Negotiable by February 4):

You may negotiate with Dr. McCarthy the percentages of homework and exams.

“Participation” includes attending class regularly, completing assignments, in-class quizzes and polls, asking relevant questions during class, seeking help during office hours, review sessions, helping to lead discussions, etc.

Final course grades will be assigned as follows: A (90-100%); B (80-89%); C (70-79%); D (60-69%); E (<60%). Borderline grades, such as B+ ($\geq 87\%$), will be rounded to the next letter grade only if the student completed extra-credit work as discussed below.

“TBD” Grades: Sometimes students misread a question, or get started in the wrong direction, or make a simple mistake that leads to the wrong conclusion. Such assignments will receive a “TBD” grade (i.e., to be determined), allowing you to get back on track to earn a 100% score if you meet with Dr. McCarthy within one week to discuss your work and arrange to improve it.

“Resurrection Points”: Dr. McCarthy encourages long-term learning throughout the semester. Even if you perform poorly on Exam #1 or #2, you can “resurrect” points lost by demonstrating correct understanding of the same concepts on the next exam(s). **Therefore, you can earn a 100% grade on the exam component of this course until the very last moment of the semester.**

Extra-credit: Excellent work on two extra-credit activities can increment your semester grade by as much as one-half a letter grade. For example, a B+ (87-89%) will become an A; however, <87% will still be registered as B. No extra-credit activities will be accepted after May 5. A maximum of two extra-credit activities is allowed, but you are welcome to undertake more! Extra-credit may be obtained by participating in activities such as public lectures, observing projects, field trips, etc. A description of such opportunities is posted on the left-hand side of our class Web site.

Honors Credit: Students wishing to contract this course for Honors Credit should email Dr. McCarthy to set up an appointment to discuss the terms of the contact. Information on Honors Contracts can be found at <https://honors.arizona.edu/academics/honors-contracts>.

Incomplete (I) or Withdrawal (W) Grades: Requests must be made in accordance with University policies, which are available as follows:

<https://catalog.arizona.edu/policy/grades-and-grading-system>

XI. Course Policies

General: UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Academic Integrity: Dr. McCarthy and the Department of Astronomy adhere to the University's Code of Academic Integrity. The Dean of Students' Web site below describes the Code and resources that are available to you for improving your work. Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Such violations of the Code can be penalized by expulsion from the University and negative reports in your official records. **If you are having difficulty in this course, PLEASE just ask for help instead of sacrificing your future.**

<http://deanofstudents.arizona.edu/academicintegrity>

The University Libraries have some excellent tips for avoiding plagiarism, available at

<https://new.library.arizona.edu/research/citing/plagiarism>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Teamwork Policy: You may **start** an assignment in a team. However, once you decide **HOW** to approach a problem, **you must then make all your own measurements and use your own wording** to interpret and express conclusions. Any assignments that appear identical will be awarded "zero" points and can lead to expulsion from the class and the University. At a minimum, such violations of the Code will lead to an Academic Integrity investigation with the Dean of Students Office.

Attendance and Absences: See also **Section III above.** Participating in the course and attending lectures and other course events are vital to the learning process. As such, **attendance is required** at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences. Notify Dr. McCarthy if you will be missing an in-person or online class session.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable:

<https://policy.arizona.edu/human-resources/religious-accommodation-policy>

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored:

<https://deanofstudents.arizona.edu/absences>

Holidays: All holidays observed by organized religions will be honored for those students who show affiliation with that particular religion. All absences pre-approved by the Dean of Students will also be accepted. <http://www.registrar.arizona.edu/calendar-religious-holidays>

Behavior: To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, Web surfing, etc.).

Dr. McCarthy promises to be respectful of all students. He expects you will do the same as stated in the Student Code of Conduct and other University guidelines concerning disruptive and threatening behavior.

<http://policy.arizona.edu/education-and-student-affairs/disruptive-behavior-instructional-setting>

The University's Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself.

<https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>

Accessibility and Accommodations: Please meet with Dr. McCarthy to discuss your accommodations and how the course's requirements and activities may impact your ability to fully participate. We strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu>) to establish reasonable accommodations.

Nondiscrimination and Anti-harassment: Dr. McCarthy is committed to creating and maintaining an environment free of discrimination as described in the University's policy at the link posted below. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. He also wants to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

XII. Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.