

ASTR 201: Cosmology
Spring 2015 – Section #001
Tu/Th 9:30-10:45 am

Syllabus

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I. Contact and User Information

Professor Dr. Don McCarthy
Email: dmccarthy@as.arizona.edu

Phone: (520) 621-4079
Twitter: @stellarDon
Office: Steward Observatory, room N404. Take the main elevator up to the fourth floor and walk straight ahead.
Office hours: Tuesday 2-4 pm; Wednesday 2-4 pm (Bookstore #304A); and by appointment
Availability: **Any** time. Please (!) do not hesitate to contact me.

Grad Teaching Asst. Ms. Decker French
Email: kfrench@as.arizona.edu
Phone: (520) 621-2494
Office: Steward Observatory, room 302, on the second floor around the corner
Availability: to be determined

Preceptors to be determined

Links, Settings, Times

Class Web site: <http://zeus.as.arizona.edu/~dmccarthy/ASTR201/index.htm>
Mastering Astronomy: <http://www.masteringastronomy.com>
Course ID is ASTR2015
Clicker: Channel #41
ResponseWare: Session ID is ASTR201
Wednesday study session:
2-4 pm (Bookstore conference room #304A)
Wednesday evening Collaborate online conferencing (9-10 pm)
<http://illuminate.oia.arizona.edu/scheduleMeetingnochair.php?sessionId=3421078>
ThinkTank: To be determined
Roof observing: Thursday from sunset to ~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 and mathematics 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.

Expectations: Students are expected to attend every class. Since each class will build on the previous one, if you miss a class, you can get behind so quickly that it may be very difficult to catch up, and you will also miss important quizzes, discussions, etc. Cell phones and electronic devices are allowed only for note-taking and answering clicker questions.

Web site: Our Web site is the focal point for the course. All course materials are posted there and available for downloading. Our class has a minor presence on the University's D2L site but it will not be emphasized except for lecture recordings.

Location: Tu/Th, 9:30-10:45 am in the auditorium of Steward Observatory, room N210. There may be occasional exceptions to be announced beforehand in class and on our Web site. Lectures will begin promptly at 9:30 am. If you arrive late, please enter quietly but you are encouraged to come up front for a good seat. Food and drinks are not allowed in the auditorium. Food and drinks are not allowed in the auditorium.

Content: Classes will emphasize a “follow the evidence” approach to 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.

III. Required Course Materials and Registration

Three items are required for this course. Used books and other editions are acceptable. Items #1,2 are available online at amazon.com as new, used, and even for rent.

Item #1. The first book is "*A Briefer History of Time*" 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. Used copies are available in the University's Bookstore and also from amazon.com (\$5-18).

Item #2. You must purchase access to an interactive Web site called "*Mastering Astronomy*" (<http://www.masteringastronomy.com>). You may purchase either with the eText (\$91.85) or without the eText (\$60.50) as described below.

The eText is an online version of the textbook entitled "*The Cosmic Perspective: Stars, Galaxies, and Cosmology*" (7th edition) written by Drs. J. Bennett, M. Donahue, N. Schneider, & M. Voit. This book is basically the second half of the thicker "*The Cosmic Perspective*" which you may have used in a previous ASTR or NATS course. If you prefer a printed version, then you can buy a used book at the Bookstore, even a previous edition. To purchase (see posted instructions), just login and “register” as a “New Student” with the 7th edition (i.e., 7e) of "*The Cosmic Perspective: Stars, Galaxies, and Cosmology*" and follow the links. Our Course ID is ASTR2015 .

Item #3. You must purchase a ResponseCard (NXT) device for use during every class. This device is the same unit you may need for the Eller School and is available in the Bookstore (\$53.50 new; \$40.25 used). It is also available online (<https://store.turningtechnologies.com/>) for \$40. We will use channel #41 during class.

Alternatively, you can buy online a cheaper license (\$15) for a ResponseWare “app” and use your laptop or various mobile devices. To purchase the clicker or the “app,” login to the above Web site and use our school code (R3Dt).

Items #2,3 must be registered for use in our specific course as described in links posted on the left side of Home Page. Follow those directions carefully.

IV. 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 pickup 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.

V. Requirements

Register your course materials

Once you have purchased the required items above, please register them for our course as described in the Content section (“Course Materials”) on the left side of our primary Web site

Your personal Messier number

On the first day of class you will be assigned the number of an astronomical Messier object as your code name for all assignments, exams, projects, and for posting of grades. **To protect your privacy, never write your personal name or student ID number on any assignments in this course. Use your Messier number instead.**

Daily Skills

Students are expected to write clear sentences and paragraphs using good English grammar for all assignments and exams. Each day will assign an additional “*Daily Skill*” in basic arithmetic and in communication. These skills should already be familiar from your previous education. Our intent is to remind you of their importance in daily life and to provide opportunities to apply them frequently. These skills must be mastered quickly and will accumulate during the course. Both sets of *Daily Skills* are located in the Content section of our Web site.

Homework assignments are a major component (30%) of this course and will emphasize skills in numeracy and writing. In a typical week, written homework will be submitted at the start of Thursday’s class and will be preceded with essential background work on Tuesdays. Homework is designed to involve each student in wrestling with the concepts presented in lectures and the textbook. These assignments will reinforce and apply concepts discussed in class and will improve your capabilities in numbers and writing throughout the semester using the “*Daily Skills*.”

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%).

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

1. You must adhere to each of the “*Daily Skills*” (numerical and communication) as they accumulate each day of our course.
2. Electronic submissions are not accepted.
3. All homework must be typewritten and stapled. Math symbols and calculations may be handwritten but must be legible.
4. 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.
5. 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.
6. Some problems require your opinion to be clearly stated. In these cases, your grade will be determined more by your reasoning and writing abilities than by the exact answer.
7. 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.

Daily quizzes (written and clicker responses) will be given to promote understanding, self-assessment, attention, participation, and teamwork. Quizzes consist of several questions spread throughout each class.

Exams

There will be two in-class exams (Feb. 19, Apr. 2, and a final exam (May 12, 8-10 am). 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 may bring a handwritten, double-sided page of notes ("crib sheet") to consult during the exam. Exams will emphasize understanding instead of memorization. Bring your UofA CAT Card, a #2 pencil, and a "scratcher" (penny, paper clip, etc.) to all exams!

Academic Integrity

Dr. McCarthy and the Department of Astronomy adhere to the University's Code of Academic Integrity (<http://deanofstudents.arizona.edu/academicintegrity>). The Dean of Students Office has prepared a [video](#) describing the Code and resources that are available to you for improving your work. It is expected that each student will do his/her own work on all exams, clicker questions, homework, labs, and projects. During his years of teaching, Dr. McCarthy has developed skills in recognizing plagiarism and outright cheating. 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.**

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.

VI. Getting Help

Office hours: Tuesday, Wednesday, Thursday or by appointment as listed in Section I.

Study session: Dr. McCarthy and Ms. French will lead an optional homework study session each Wednesday afternoon from 2-4 pm in the University's Bookstore, room #304A on the north side of the second floor in the Student Union. Students are welcome to attend and work with each other and with the instructors. To receive help from the instructors on any problem, you must already have attempted that problem. Students will be asked to help each other and to lead discussion.

Collaborate: On Wednesday evenings (9-10 pm) Dr. McCarthy is available online via the Web conferencing tool called *Collaborate*. A Web link to *Collaborate* is posted in Section I of this syllabus and on our Web site.

Tutoring: The University's "Think Tank" offers tutoring for astronomy. The location and time will be announced in class.

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 LASC 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 lecture will be posted on our [D2L](#) site. 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.

VII. Course Policies

Absences: You are required to attend each class in accordance with University policy (<http://catalog.arizona.edu/2007-08/policies/classatten.htm>).

Holidays: All holidays <http://www.registrar.arizona.edu/religiousholidays/calendar.htm> 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.

Behavior: Dr. McCarthy promises to be respectful of all students. He hopes you will do the same as stated in the Student Code of Conduct (<http://deanofstudents.arizona.edu/policiesandcodes/studentcodeofconduct>) and other University guidelines concerning disruptive (<http://policy.arizona.edu/disruptive-behavior-instructional>) and threatening (<http://policy.web.arizona.edu/threatening-behavior-students>) behavior.

Special accommodations: If you anticipate barriers related to the format or requirements of this course, please meet with Dr. McCarthy so that we can discuss ways of ensuring your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; <http://drc.arizona.edu>) and notify Dr. McCarthy of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

VIII. Grading

Course Grade: Students have two options for calculating their semester grade. Grades will be derived from the following categories with the indicated percentage weights.

OPTION #1 (Default):

Daily homework (30%)

Three exams, including the final exam (30%)

Mastering Astronomy (20%)

Participation: Quizzes, “clicker” questions, office hours, study sessions, etc. (20%)

OPTION #2 (Negotiable by February 3):

Optional project (see section below) to be approved by Dr. McCarthy, counting 15%. You may negotiate the percentage of homework and exams. For example:

Daily homework (25%)

Three exams, including the final exam (25%)

Mastering Astronomy (15%)

Participation: Quizzes, “clicker” questions, office hours, study sessions, etc. (20%)

“Participation” includes attending class regularly, completing assignments, in-class quizzes, asking relevant questions during class, seeking help during study sessions and office hours, 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 or Ms. French within one week to discuss your work and arrange to improve it.

“Resurrection Points:” We encourage 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 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.

For example, if you missed 2 of 5 questions relating to the concept of “gravity” on the first exam, you can “resurrect” points by correctly answering 3, 4, or all of the 5 questions in a similar section on the second exam or on the final exam. You cannot lose points in this process.

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 6. 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.

Optional Project: Each student may undertake a substantial project that will comprise 15% of the final grade. The project can take many different forms and must be approved in advance by Dr. McCarthy by February 3 and summarized in a brief proposal. Three main projects have been popular:

Project #1: Observing sessions where you keep a detailed journal charting the motions of the Sun, Moon, planets, and stars under the guidance of Dr. McCarthy on Thursday evenings. You will observe and record these objects using naked-eye and telescope observations spread throughout the

semester. You will also build and operate simple tools for making these measurements: Planispheres, astrolabes, telescopes, etc.,

Project #2: Build your own crystal radio to help understand electromagnetic fields. As part of small groups of students, you will work for one hour per week personally with Dr. McCarthy to build your own radio that operates only by the energy of light itself (i.e., no batteries or power source). You will have fun using electronic techniques and instruments. This project is funded by the Dean of Students through the Student-Faculty Interaction program:
<http://www.studentaffairs.arizona.edu/faculty/grants/> .

Project #3: Formal dinner debates on sometimes controversial science- and policy-related topics. Dinner will be provided through the Student-Faculty Interaction program. One example topic out of many possibilities is the following: “To understand how the Universe formed and how we evolved from it, we need to look back into the past by studying the most distant stars and galaxies. Astronomers have invested in large telescopes to detect such faint objects. However, human-caused light pollution increasingly brightens the skies and reduces the effectiveness of our observatories. Should the government protect dark skies as a natural resource?”

Additional options might include very specific reports on astronomical topics, hands-on projects, and special opportunities for interviews (e.g., Vatican Observatory; NASA Projects, etc.). Possible opportunities will be discussed in class. We prefer you choose a project of benefit to you - either because it has interested you for a long time or because it relates to your talents and future career (engineering, business, art, poetry, teaching, journalism, etc.). Each project will be based on research and reading beyond the level of a textbook, encyclopedia, or simple Internet pages.

On or before February 3, you must discuss your ideas with Dr. McCarthy, receive approval, and submit the following:

1. A suggested title
2. A 100 word typewritten abstract about your project’s goals and what you will accomplish
3. A four page rough draft may be due at the beginning of class on April 2. Editorial comments will be returned to you and you are expected to follow these suggestions to improve your final version. The completed project is due at the beginning of class on May 6.