

Astronomy 201 Cosmology

Spring 2008 - Section 1

Tu/Th 9:30-10:45 AM

Syllabus

Professor

Dr. Don McCarthy

Email: dwmccarthy@gmail.com

Phone: (520) 621-4079

Class Web site: <http://zeus.as.arizona.edu/~dmccarthy/ASTR201/index.htm>

Office Hours: Wed. 2-4 PM or by appointment

Study session: Tuesday 2-4 PM (room 550)

AIM help: Wednesday 9-10 PM

Office: Steward Observatory, room N404. If you take the main elevator up to the fourth floor, you can walk straight ahead into my office.

Graduate Teaching Assistant Ms. Amy Stutz

Email: astutz@as.arizona.edu

Phone: (520) 621-4934

Office Hours: Mon./Wed. 2:30-3:30 PM or by appointment.

Office: Steward Observatory, room 214. It is the first office on your left if you enter the building from the south entrance.

I. To Succeed

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

1. Read directions carefully.
2. Think about material instead of just memorizing it.
3. Attend every class. Each lecture will present new material, related to the reading assignment but from a different perspective, with different images, demos, etc.
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. Proofread your work carefully to avoid careless errors.
6. Ask questions Dr. McCarthy encourages questions/discussion and is available to help. Any question is valid - ask it!
7. Seek help whenever needed by asking questions, attending office hours and study sessions, or by making an appointment.

II. Course Overview

ASTR 201 is a three credit, general education course at the Tier II level intended for those students with no university-level background in science and mathematics. We will focus on understanding (not memorizing) the physical processes at work in the Universe, developing the ability to solve problems, improving confidence and skill in quantitative expression, and building an awareness of how science influences daily life.

III. Classes

Location: Tu/Th, 9:30-10:45 AM in room 140 of the Integrated Learning Center (ILC). There may be occasional exceptions to be announced beforehand in class and on the class Web site. Lectures will begin at 9:30 AM sharp on regularly scheduled class days. If you arrive late, please

enter the classroom quietly but feel free to come up front for a good seat. Please do not bring food or drinks into the auditorium.

Content: Interactive "lectures" will concentrate on major discoveries and new perspectives of our Universe. Classes will emphasize hands-on measurement and observational skills related to the concepts presented in classes that week. This "follow the evidence" approach will help develop problem-solving skills and reinforce understanding of the scientific method.

Lecture material will supplement and expand upon the required reading using PowerPoint, digital animations, videotapes, music, laboratory equipment, and liquid nitrogen as teaching tools. Impromptu quizzes will be given to promote understanding, self-assessment, attention, and participation.

Absence policy: You are required to attend each class in accordance with University policy (<http://catalog.arizona.edu/2007-08/policies/classatten.htm>). Each lecture will build on the previous one. Therefore, if you miss class, you can get behind so quickly that it may be very difficult to catch up and you might also miss impromptu quizzes.

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. I hope you will do the same as stated in the Student Code of Conduct (<http://dos.web.arizona.edu/uapolicies>) and other University guidelines concerning disruptive (<http://web.arizona.edu/~policy/disrupt.shtml>) and threatening (<http://policy.web.arizona.edu/~policy/threaten.shtml>) behavior.

Special accommodations: Students who are registered with the Disability Resource Center must submit appropriate documentation to the instructor if they are requesting reasonable accommodations: <http://drc.arizona.edu/learn/index.html>.

Lecture notes: The text of each lecture can be downloaded in outline form ahead of class. You must attend class to experience the associated images, graphs, animations, videos, and demonstrations. This convenience is provided so you can THINK about the material instead of mindlessly writing your own notes. Please print them out and bring to class so you can add your own thoughts as the lecture proceeds.

IV. Course Materials

There are two textbooks for this course. Both books are available in the University Bookstore. 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.

The second book is "*The Cosmic Perspective: Stars, Galaxies, and Cosmology*" (5th edition) written by Drs. J. Bennett, M. Donahue, N. Schneider, & M. Voit. This book is basically the second half of the "*The Cosmic Perspective*" which you may have used in a previous NATS course. You may use the previous edition. At the end of each chapter are sections entitled The Big Picture, Summary of Key Concepts, Review Questions, Discussion Questions, and Problems. I encourage you to spend time in these sections to help test and develop your understanding and to prepare for the examinations.

You **are required** to enroll in the authors' interactive Web site called "Mastering Astronomy" (<http://www.masteringastronomy.com>). There you will find supplementary materials like movies, graphics, etc. and you can also practice problems, view tutorials, take self-quizzes, etc. Please follow these directions carefully:

1. Access the above site.
2. Select the **righthand** picture of our textbook described above.
3. Register using the Student Access Code that was packaged as an insert in your textbook. Use whatever name and password you prefer.
4. Enroll in our specific course. Use your STAR NAME as the "Student ID" and use "ASTR201MCC" as the "Course ID."

V. Class Web Site

The class Web site (<http://zeus.as.arizona.edu/~dmccarthy/ASTR201/index.htm>) is the focal point for the course. All course materials (syllabus, homework, lecture notes, announcements, daily calendar, grades) are posted there and available for downloading.

VI. Communication

PLEASE let me know if you have any disabilities which might make it difficult for you to hear, see, take notes, or understand course material.

Classes and examinations will be conducted in English. Students are expected to write clear sentences and paragraphs using good English for reports and exam questions. Always proofread your work before submitting it!

Please(!) do not hesitate to contact me at any time. In addition to the class Web site, a bulletin board in the hallway near my office will post the course syllabus, any recent announcements, sign-up sheets, and astronomical event notices.

VII. Preceptors

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 UNVR 197a (<http://teachingteams.arizona.edu/197a.htm>) and completing several workshops 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/index.htm>).

VIII. Star Name

You have been assigned a star name as your code name for all assignments, exams, the required project, and grade distribution. **Never write your personal name or student ID number on any assignments in this course. Use your star name instead.**

IX. Academic Integrity

Dr. McCarthy and the Department of Astronomy adhere to the University's Code of Academic Integrity (<http://dos.web.arizona.edu/academicintegrity/index.html>). It is expected that each

student will do his/her own work on all exams, homework, labs, and projects. **Even if you are part of a team solution to a problem, you must use your own wording, measurements, and ideas in summarizing the solution and expressing conclusions.**

IMPORTANT NOTE: 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.

During my years of teaching, I have 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.**

X. TurnItIn.com

If you decide to take and continue in this course, you may be instructed to submit your papers online to a plagiarism-prevention program called TurnItIn.com. When you set up your individual account with TurnItIn.com for this class, make sure you understand and consent to all the terms that the program provides you at that point.

You should note that TurnItIn.com – always without your name and any personal information – will retain your paper as part of their database so that students who plagiarize from it can be detected. Because of this program, the vast majority of you who do your own work and cite your sources of information properly will not have to compete with students who commit undetected plagiarism. Anyone who has questions or problems with TurnItIn.com may talk privately about these with the instructor.

XI. Homework

Weekly homework assignments are a major component (45%) of this course. They are designed to involve each student in wrestling with the concepts presented in lectures and the textbooks. These assignments will also reinforce and apply concepts discussed in class. A few quizzes will be given during class. At the end of the semester the average score of the quizzes will be equivalent to an additional homework assignment.

Occasional “Reaction Paper” essays are meant to engage you in specific topics and to enable you to express your opinions and interpretations 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%).

Homework is due at the start of class on the specified date. Electronic submissions are not accepted. If an assignment is turned in late, a **late-penalty** of 10% will be assessed for each class period that has elapsed since the due date. Assignments will not be accepted after Tuesday of the following week.

The following rules apply to homework assignments:

- 1.** All homework must be typewritten and submitted in printed form. Math symbols and calculations may be handwritten but must be legible.

2. 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.
3. Some problems only 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.
4. You may **START** an assignment in a team. However, after deciding **HOW** to approach a problem, you must then make all your own measurements 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.

Study session: Dr. McCarthy will conduct optional homework study sessions each Tuesday afternoon from 2-4 PM in room 550. To participate, you must have already attempted all the problems or activities. Students may be asked to help each other and to lead discussion.

AIM Homework Help Session: On Wednesday evenings (9-10 PM) Dr. McCarthy is available online via AOL Instant Messenger. His screen name is "mccarthdw".

XII. Examinations

There will be two in-class exams (Feb. 21; Apr. 3) and a final exam (May 13, 8-10 AM). The two-hour final exam will emphasize the final third of the course and provide "Resurrection Points" for students to earn back points lost in previous exams. The format of all exams will include multiple choice and short essay questions.

An informal review session will be held one or more days ahead of each exam to provide you an opportunity to ask questions and to practice concepts presented during the course. Sample exams from past courses are available at the same locations as the lecture notes as listed above.

ALL exams will be OPEN-BOOK and OPEN-NOTES. Exams will emphasize understanding instead of memorization. Bring your UofA CAT Card and a #2 PENCIL to all exams!

There will be NO makeup exams except in cases of extreme difficulty such as a proven illness.

XIII. "Resurrection Points"

This opportunity encourages you to master all the major concepts taught and demonstrated in this course, even if it requires the whole semester, and even if you perform poorly on the first two exams. I recognize that people learn at different speeds and that scientific concepts are often not intuitive, requiring extra time and effort to understand.

In this course students can recover points lost on previous exams and can earn a 100% grade on the Exam component of this course until the very last day of class. Dr. McCarthy does not grade on a curve so that each person can earn an "A" by demonstrating understanding of the scientific concepts presented and illustrated in class. Therefore, you will not be competing against your classmates for exam grades.

You can "resurrect" points you may have lost on an early exam by demonstrating correct understanding of the same concept on the next exams. For example, if you missed 3 of 5 questions relating to the concept of "gravity" on the first exam, you can "resurrect" points by correctly answering 4 of 5, or 5 of 5, questions in a similar section on the second exam or on the final exam. You cannot lose points in this process.

I encourage you to master the scientific concepts as early as possible. By waiting until the end of the semester to understand them, you will be placing unnecessary stress on yourself and increasing your likelihood of failure.

XIV. Optional Project

Each student may undertake one project that will comprise 25% of the final grade. The expected amount of work for this project should be at the level of ten page report. However, the project can take many different forms as described below. The topic must be approved in advance by Dr. McCarthy. Typical class projects might include reports on topics in cosmology, hands-on projects, and special opportunities for interviews (e.g., Vatican Observatory; NASA Projects, etc.). Possible opportunities will be discussed in class. It is my desire that 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 should cover a topic of interest to you personally. It will be based on research and reading beyond the level of a textbook, encyclopedia, or simple Internet pages. Projects must be focused on a specific topic. For example, a report on "galaxies" is not acceptable but a thorough study of the Local Group or the Virgo Cluster is appropriate. A bibliography of at least five references is required. At least two must be more recent than 1995. You must thoroughly cite material or ideas you borrow from other sources. As stated in Section IX, your writing skills will count in assigning a grade. Please proofread your report very carefully!

On or before February 16, you must discuss your ideas with Dr. McCarthy, receive approval, and submit the following:

1. A suggested title.
2. A 100 word typewritten abstract outlining the goals of your project and what you intend to accomplish.
3. A four page rough draft is due at the beginning of class on March 22. 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 April 26.

Possible projects might include but are not limited to the following ideas:

1. Detailed interviews with people associated with real cosmological observations. Many local scientists, engineers, administrators, etc. are available and willing. Historical reports, such as:
 - a). the role of a particular astronomer in cosmology (past, present, future);
 - b). discoveries of certain phenomena (pulsars, cosmic microwave background, dark energy,...).
2. Specific and detailed follow-ups to lecture and text presentations.
3. Creative writing relating to cosmology.
4. Hands-on construction projects such as scale models of the solar neighborhood, Local Group, Local Supercluster, etc.

There may well be some aspect of cosmology which interests you but is not covered in the above discussion. Perhaps you have a talent you would like to utilize in an astronomical context. Should this be the case, create your own project, have it approved by Dr. McCarthy and do it! **THE MORE CREATIVE, THE BETTER!**

XV. Grading

Students have two options for determining the calculation of grades, one of which requires a significant project to be completed with the approval of the instructor. You must choose the

option best for you immediately after the first exam. Grades will be derived from the following categories with the indicated percentage weights.

OPTION #1:

- Homework and papers, counting 45%;
- Three exams, including the final exam, counting 45%;
- Participation, counting 10%.
- The average of all quizzes counts as one homework.

OPTION #2:

- Homework and papers, counting 45%;
- Three exams, including the final exam, counting 25%;
- Optional project to be approved in advance by Dr. McCarthy, counting 20%;
- Participation, counting 10%.
- The average of all quizzes counts as one homework.

“Participation” includes attending class regularly, 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%).

Current grades will be posted weekly on the class Web site throughout the semester.

XVI. 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+ will become an A; however, a B becoming a B+ will still be registered as B in the University's grading system. No extra-credit activities will be accepted after May 6. A maximum of two extra-credit activities is allowed.

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 our class Web site.