

ASTRONOMY 101

Section 004

Introductory Astronomy

Scheduled Course Meeting: Monday and Wednesday evening, 6:00 - 7:15 PM,
NM Museum of Natural History & Science - Domed Theater
1801 Mountain Road – South Entrance (Doors open at ~5:45 pm)

Professor:

Neil McFadden & Dr. John McGraw
Physics & Astronomy 128
(NE corner Yale and Lomas)
nmcfadde@unm.edu
mcgraw@phys.unm.edu

Domed Theater:

Jim Greenhouse,
NM Museum of Nat. Hist. & Sci.
1801 Mountain Road NW
841-5955 (Information Hotline)
www.nmnaturalhistory.org

Office Hours:

By appointment - please email or see Professor McFadden to schedule. If you need help or just want to chat, do not hesitate to ask.

COURSE DESCRIPTION

Astronomy is a discipline based upon observation of the sky. It is an exciting exploration that supports the notion that “the universe is not only stranger than we know; it is stranger than we *can* know.” Because of its importance in founding society, astronomy represents an exploration undertaken by virtually every culture on the planet over the last 10 millennia. Now we’ll take our turn at learning about the sky.

In this course, using observations obtained with instruments ranging from our eyes to the most sophisticated ground- and space-based telescopes, we’ll learn about the objects we observe in the sky. Further, we’ll investigate the universe of these objects as a dynamic, evolving place. We’ll consider the evolution of stars and their planets, galaxies, and the universe itself. More usefully, perhaps, we’ll learn how scientists approach and solve problems, because many of these techniques usefully translate into problem-solving techniques useful in virtually any aspect of life.

All you need to bring is a healthy curiosity about the universe, a willingness to learn, and the open mind, responsibility and dedication of a true university student.

Together we’ll have fun exploring, thinking, observing and learning about astronomy. I hope to share with you some of my love for and excitement about this most universal science.

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Class Format:

The class format is principally based on lectures, discussions and question/answer sessions held in the Domed Theater of the *NM Museum of Natural History and Science*. We may hold class in other areas of NMMNHS, or even in other locations if the opportunity for unique learning presents itself.

Textbook:

The **required** textbook is “Astronomy, A Beginner’s Guide to the Universe” Chaisson and McMillian, Eight Edition. Make sure you have a copy of Mastering Astronomy that comes with the textbook.

The lectures will generally follow the text, though I’ll also introduce additional material that might give new or different perspectives or the latest breaking news in astronomy. Please, **read your book regularly** – stay ahead of the lectures. Your learning experience and test preparation will benefit.

Our goal is to help you understand the form and function of our universe. Note the word “help”: understanding is always yours to discover. Our job is to help optimize your discovery process.

We will not cover all of the material in the text, nor will we always explore in great depth all of the material we do cover – there simply isn’t enough time in the semester for this. This book is very inclusive of the latest developments in astronomy, and covers topics in sufficient depth that individuals can explore further on their own. This book provides a depth of understanding typical of someone interested in perhaps entering astronomy or other of the natural sciences as a career. If we collectively do our jobs during this semester, many of you will end up reading this book from cover to cover and using the other resources we provide long after the class is completed.

The book also points to other resources for those of you interested in astronomy and other sciences.

Homework:

There will be regular reading assignments and homework. Reading assignments should be completed BEFORE the class time. Homework assignments will be completed on-line through the Mastering Astronomy web pages. You will have to register at the Mastering Astronomy web site at <http://www.masteringastronomy.com/site>.

You must enter the **COURSE ID: ASTR101F2017MCFADDEN**. When you register be sure to put in your UNM_ID as your "Student ID". It is recommended that your login name be your UNM e-mail, although if you have an existing login name from another course that should work too. These 19 assignments will be 20% of your grade. They will be assigned a week prior to the corresponding lecture and due a week after that lecture. There will 1-2 due each week. Each assignment will take roughly 30 minutes. For each day that the homework is turned in late 30% will be taken off. Students not enrolled in Master Astronomy by September 1st will be **DROPPED** from the class.

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Web Site:

Look at <http://physics.unm.edu/Courses/McFadden/> to find this syllabus, the Introductory Questions presented at the start of each class, and other astronomy resources and information about our class.

Tests:

There will be a total of four tests, upon which will be 20% each of your grade. The *tentative* schedule for these hour-long tests is 13 September, 9 October, 1 November, and 11 December. Note that the exact dates of these tests can and will change. It is your responsibility to attend class to ensure that you know when the tests will actually be given!

Grading:

Grades will be given. They will be based upon the tests and assignments. Grades for the course will be assigned on the basis of the percentage of correctly answered questions on the tests. I reserve the right to “curve” grades to ensure that testing is conducted at a level appropriate to learning. “Curving” cannot lower your grade, it can only improve it, and the curve is applied *only* at the end of the semester. Continuous, significant improvement throughout the semester will also warrant a higher grade.

Missed Tests:

We know that emergencies can and do occur. If you must miss a test, please let me know as soon as possible, but before the date of the test (if possible). One make-up test is allowed within one week of the missed exam, no exceptions. Based on our discretion, you may not be allowed to make up an exam.

Observing:

A 16-inch telescope will be available for observing the sky after many of our classes. These observations, with tutoring by an expert observer, will count towards the observing requirements of ASTR-101L, the laboratory class that, when taken with ASTR-101 (not necessarily concurrently), fulfills the A&S science requirement.

Comments:

This course will be successful for me if *you* are successful. My purpose is to do the best job I can at enabling your understanding of the content, physical laws and evolution that created the universe we can observe. I also want to expose you to the techniques used by scientists, because critical thinking, skepticism and the ability to reason logically and quantitatively are extremely useful traits applicable in virtually any career.

Communication about the class, special events, scheduling and announcements will be made by email. Please ensure that I have your “best” email address so you get all notices and information. Valid communication is bidirectional. Thus, you are responsible for communicating with me, too!

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Lecture schedule:

	Topic	Reading
21 Aug	Introduction -- Quick Tour of the Universe	
23 Aug	Charting the Heavens, Foundations of Astronomy	Chap. 0, A-1, A-2
28 Aug	The Copernican Revolution	Chap. 1
30 Aug	Radiation and the Electromagnetic Spectrum	Chap. 2.1-2.4
4 Sept	Labor Day: NO CLASS	
6 Sept	Atoms and Spectroscopy	Chap. 2.5-2.8
11 Sept	Telescopes	Chap. 3
13 Sept	Test #1	
18 Sept	Introduction to the Solar System	Chap. 4.1-4.3
20 Sept	The Earth	Chap. 5.1-5.6
25 Sept	Our Moon, Mercury and Venus	Chap. 6.1-6.5
27 Sept	Mars	Chap. 6.6-6.8
2 Oct	The Jovian Planets	Chap. 7
4 Oct	Moons, Rings, Pluto and other Solar System Debris	Chap. 8
9 Oct	The Sun	Chap. 9
11 Oct	Test #2	
16 Oct	Measuring the Stars	Chap. 10
18 Oct	The Interstellar Medium and Star Formation	Chap. 11
23 Oct	Stellar Evolution	Chap. 12.1-12.3
25 Oct	Stellar Explosions	12.4-12.7
30 Oct	Test #3	
1 Nov	Neutron stars, pulsars, and magnetars	Chap. 13.1-13.4
6 Nov	Black Holes	Chap. 13.5-13.8
8 Nov	Special Relativity	Chap. 13.6
13 Nov	The Milky Way Galaxy	Chap. 14
15 Nov	Galaxies	Chap. 15.1-15.3
20 Nov	Active Galaxies	Chap. 15.4-15.5
22 Nov	Dark Matter and Galaxies	Chap 16
27 Nov	Neutrino Physics	
29 Nov	Cosmology	Chap. 17
4 Dec	Life in the Universe	Chap. 18
6 Dec	Test #4	
11 Dec		