



Introduction

This class will deal with the very relevant and beautiful aspects of our solar system. We will journey from planet to planet, to their moons and to the Sun, uncovering details about many things you have probably always pondered. The first part of the course will concentrate on the fundamentals of astronomy and its history throughout human history. Then we will try to understand some of the basic physical principles that govern the large-scale behavior of astronomical bodies. We will use this knowledge to survey the properties of the planets, asteroids, and comets in our solar system, as well as our star, the Sun.

Objectives for learning

To do well in this course, you have to *participate, listen, and learn*. *Participating* means turning up to all lectures and labs, taking part in discussions and in-class tutorials and handing in all assignments on time. *Listening* means paying close attention to me and the TAs. *Learning* is the most important element and this is your responsibility. On the evening before each lecture, you should spend 30 minutes reading the textbook and completing any reading assignment. On the evening after each lecture you should spend 30 minutes studying the lectures notes and textbook once more and completing any related homework questions. With this simple approach, learning will be almost automatic, you will find the class much more enjoyable and you will get a good final mark. If you fail to carry out any one of these three objectives of participating, listening and learning, you may find this class a burden and you'll probably get a poor final mark.

This course has been certified as part of New Mexico State University's General Education Core Curriculum (GECC). The GECC attempts to foster intelligent inquiry, abstract logical thinking, critical analysis, and the integration and synthesis of knowledge; it strives for literacy in writing, reading, speaking and listening; it teaches mathematical structures; acquainting students with precise abstract thought about numbers and space; it encourages an understanding of science and scientific inquiry; it provides a historical consciousness, including an understanding of one's own heritage as well as respect for other peoples and cultures; it includes an examination of values and stresses the importance of a carefully considered values system; it fosters an appreciation of the arts; and general education provides the breadth necessary to have a familiarity with the various branches of human understanding.

This course will make heavy use of the WebCT course webpage. You are advised to check it often for all relevant information pertaining to the class and for extra material (such as worked out problem examples and interesting web links). Announcements will be posted for upcoming due dates on assignments and possibilities of extra credit. Most importantly, always keep one step ahead of the course, noting future reading schedules and assignments.

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Course Details

Prerequisites

There are no prerequisites for this course. All mathematics will be introduced from an introductory level. The mathematics required will be presented in the labs and homeworks.

Materials and Textbook

Textbook: The Cosmic Perspective, Fifth edition: The Solar System. Bennett, Donahue, Schneider, Voit. Addison Wesley, 2009. The textbook can be purchased in the campus bookstore and hopefully many used copies will be available. A cheaper option may be to find it online (e.g., amazon). We will follow the textbook closely (see calendar below) so you are advised to read ahead and read carefully. Reading assignments and homeworks will be based on this textbook

Lab manual: To obtain the lab manual, you have two options. You can purchase it at the Kinkos near campus for about \$25. Or, you can download it <http://astronomy.nmsu.edu/astro/Ast105labmanual.pdf> and then print it out yourself. You can also just print out one lab at a time. You must bring a print out of the appropriate lab along each week.

Course WebCT homepage: The WebCT page will contain all the class notes, reading assignments, homeworks, quizzes and solutions, notes on extra credit, exam study guides, and the syllabus calendar.

MasteringAstronomy.com: If you purchased a new textbook, an access code to the Mastering Astronomy website came along with the book. Otherwise, if you have a used book, the code can be purchased for \$27. This site is integrated with the textbook and contains many illustrations of the concepts found in the text, with animations, movies, graphs, etc. It can be a very useful resource for you and I also may use it once in a while for demonstration purposes, **but it will not be required** of you to have an account.

Time and location

Classes will meet on Tuesdays and Thursdays at 11:45am - 13:00am in the Biology Annex (102). There are 3 Lab session associated with this class. There are
 M03, Tuesdays, 2:30 until 4:30, Room 232 Walden Hall
 M04, Tuesdays, 4:30 until 6:30, Room 232 Walden Hall
 M05, Wednesdays, 2:30 until 4:30, Room 114 Science Hall
 Note there are a few exceptions to these locations.
 You must register and attend one of these labs sessions.

Teaching assistants

Name:	Bobby Edmonds (M05)	Jacqueline McCleary (M03, M04)
Location	Astronomy 107	Astronomy 109
Phone	(575)646-4934	(575)646-3409
Email	redmonds@nmsu.edu	mcclary@nmsu.edu

The teaching assistants will instruct the labs and help out with grading and other course components.

Office Hours

My fixed office hours are 2:00pm until 3:00pm on Mondays. Please email me in advance to book a slot as reservations will be honored before drop ins. If you cannot make it during this time, please email me to organize an alternative. If you have any problems or issues, particularly if you feel you are falling behind in the course, make a point of speaking to me. When you need to contact me do so through Blackboard in a professional manner (i.e., begin the email with Dear Professor, ask your question, suggest a time to meet, end the email with your name and email address).

Course Elements and Grading

There are 5 main course elements which will contribute to your final grade. In each case the results will be curved to account for difficulty, and we will adopt the general marking system (including plus / minus) of

A: greater than 90%

B: 80% to 89%

C: 70% to 79%

D: 60% to 69%

F: less than 60%

Exams: There will be 1 end of term exam for this course, Tuesday 3rd May, 10:30 until 12:30. **This exam contributes 30% of your final mark.** Note this means that 70% of your mark is obtained throughout the semester. This gives you a wonderful opportunity to enter the exam with a good score already obtained. Alternatively it means that if you fail to perform during the semester you'll probably not be able to pull you mark up with a good exam score.

Lab Exercises: Everyone must attend and complete labs. At the end of each lab, there will be a brief take-home assignment which is due at the *beginning* of the following Lab. Late assignments will be marked out of 50% for 1 week. After 1 week, you will be given a 0 mark and you will be asked to come to my office to explain this. Note that it is mandatory to attend and hand all the weekly lab exercises, even if you are more than one week late. Get your lab exercises completed on time - do not lose these marks. If you miss labs you must explain why to your TA. If you continue to miss labs or fail to hand in the take-home assignments I will call you to my office for an explanation. You can make up your marks by participating in the Observatory evenings - ask the TA for further details. **Together these Labs will contribute 20% to your final mark.**

Quizzes: There will be weekly quizzes every Thursday with questions covering the lectures from that week. These written quizzes will consist of 10-15 short questions. There will be no make up quizzes - if you do not complete a quiz up you get a 0 mark. Do not stress or worry about these quizzes. If you prepare for reading assignment, complete the in-class tutorials and attempt the homeworks in the evening then you will score well on these quizzes without the need for extra study. If you miss quizzes on a regular basis or if you continue to score low grades you will be called my office to provide an explanation. **Together these quizzes are worth 10% of your final grade.**

Homeworks: There will be one homework assignment issued every week, on the Tuesday morning. The homework are due at the beginning of the Thursday lecture in the following week. Late home works will be marked out of 50% for 1 week, then given a 0 grade and you will be asked to come to my office to explain. Note that it is mandatory to attempt all the homeworks, even if you are more than one week late. Get homeworks completed on time - do not lose these marks. **Together these homeworks contribute 25% of your final mark.**

Participation: Participation means completing the reading assignments before class, attending class and labs, answering questions in the lectures, and completing the in-class tutorials. Each class and lab you attend is worth 1 mark. Each reading assignment you complete is worth one mark. Hence there are 5 marks available each week, just for participating. **Overall your participation is worth 15% of your final mark.** Note this 15% is easy to obtain, can make the difference between grades, and you should expect to obtain almost all these marks.

Calculators

You will need a calculator which is capable of performing arithmetic operations such as exponents (e.g., squares, cube roots), powers of ten (scientific notation), and geometry (sin, cos, tan). Note this automatically discounts all cell phones.

Return of written works

Written works (homeworks, quizzes, in-class tutorials, labs) will be marked by the TAs and returned to you during class. Your curved grades for each assignment will be made available on your Blackboard grade book in a timely fashion.

Detailed Syllabus and Calendar

I have provided an outline for the syllabus and calendar for this course below. Note changes to this calendar are possible. I will maintain an updated version of the calendar at

<https://www.google.com/calendar/embed?src=profmcateer@googlemail.com>

This will also be linked to through Blackboard.

Your typical week should consist of reading the chapter before the lectures, completing the reading assignments, reviewing the lectures and attempting the homeworks after each lecture. If you complete each homework question as you go along it will be much easier than having to complete homeworks the night before they are due. I also strongly recommend you attempt to complete the lab assignments as soon as possible each week. Quizzes occur at the end of each week. If you know you need to miss a class or quiz, let me know in advance. I may be able to organize for you to hand in a homework, lab exercise, or complete a quiz in advance. I know some students will have to miss some classes or labs (everyone can get sick, or unexpected events can happen) - this is why there are some make-up opportunities. If you unexpectedly miss class for a valid reason, let the TAs know why when you return. Anyone who is not attending, not participating, or failing the class will be called in to explain why.

Week		Topic		Labs		Homework		Quiz
#	Lecture dates	Name	Book Ch #	Name	#	Handed out	Due in	Weeks
	13-January	Intro	N/A	N/A	N/A	N/A	N/A	None
1	18-January 20-January	Our Place	1	Tools for success	1	1	None	1
2	25-January 27-January	Discovering the Universe	2	Density	8	2	1	2
3	1-Feb 8-Feb	Discovering the Universe	S1	Model of solar sys.	7	3	2	3
	10-Feb	Science of Astronomy	4	Phases of the Moon	3			
4	Week 4 merged with week 3 due to snow closures							
5	15-Feb 17-Feb	Our Planetary System	7	Origins of Seasons	2	5	3	5

Week		Topic		Labs		Homework		Quiz
#	Lecture dates	Name	Book Ch #	Name	#	Handed out	Due in	Weeks
6	22-Feb 24-Feb	Solar System Formation	8	The Orbit of Mercury	6	6	5	6
7	1-March 3-March	Motion, Energy, Gravity	4	Kepler's Laws	5	7	6	7
8	8-March 10-March	Planetary Geology	9	Earths' Density	9	8	7	8
9	15-March 17-March	Planetary Atmospheres	10	Surface of Moon	12	9	8	9
	22-March 24-March	SPRING BREAK. NO CLASSES, LABS, ASSIGNMENTS OR QUIZZES						
10	29-March 31-March	Life	24	Surface Water on Mars	15	10	9	10
11	5-April 7-April	Jovian Planets	11	Heat Loss from Io	16	11	10	11
12	12-April 14-April	Asteroids and Comets	12	Build a Comet	17	12	11	12
13	19-April 21-April	The Sun	14	The Sun	19	N/A	12	13
14	26-April 28-April	REVIEW WEEK. REVIEW LECTURES AND REVEIW LAB (20)						
15	3-May	EXAM WEEK.						

Note this syllabus is subject to changes at short notice. Any changes will be announced in class and on WebCT. At the end of each week I will provide a summary of the book chapters covered during each lecture.

Other policies and notices

1. Attendance to the lectures and Labs is mandatory. Attendance will be taken at each class through the use of in-class tutorials. This may be used to determine a student's credit when the time comes to submit final grades. Let the TAs know ahead of time if you will miss class for a valid reason. Many unexcused absences tell me that your commitment to the course is not strong enough. Another important reason to attend class is to complete the quizzes and participate in the weekly discussions. Make ups for any quizzes or exams will only be considered if I am contacted ahead of time and presented a reasonable excuse for absence.
2. This is a 4 credit course.
3. You must enlist in one of the lab classes - it is mandatory.
4. The last day to add a course is January 25
5. The last day to withdraw from a course with a 'W' grade is March 8
6. Cellphones must be turned off for the duration of the class period. Laptops will be permitted in class if that is your preferred method of taking notes, although it is encouraged to use notebooks instead since you will need to make drawings and write equations.
7. Cheating and plagiarism will be punishable according to the procedures demanded by the University and spelled out clearly in the student code of conduct handbook. The penalties are severe and not worth it, so just simply do not cheat or plagiarize. **I encourage you to work with your fellow students on homeworks, but this does not mean you hand in exactly the same answers.** Instead discuss the problems and then make your own attempt at the answer.
8. If you have any problems whatsoever, speak to me directly as soon as possible
9. Official communication to you will often come through your NMSU e-mail from WebCT. Please access it regularly, or forward it to your currently used address, as your success in college may ride on your ability to respond quickly.
10. Feel free to call the Director of Institutional Equity, at 575-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.
11. Feel Free to call the Coordinator of Services for Student with Disabilities, at 575-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially. If you are already registered with the SSD office, and need accommodations, please provide your "Accommodation Memo" from the SSD within the first 2 weeks of class. If you have a condition which may affect your ability to exit from the premises in case of an emergency, you are encouraged to discuss this with your instructor (or SSD Coordinator). If you have general questions about the Americans with Disabilities Act (ADA) call 646-3333.

R.T.JAMES MCATEER
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TEACHING PHILOSOPHY

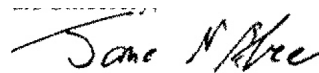
It is a natural human instinct to explore, to reach for the stars, to let our minds wonder and wander. I want to help students regain this instinct. As children we always ask 'Why', but as adults we sometimes lose that attitude to questioning everything we see. How come as adults we no longer stare in amazement at a balloon, or a firework, or an airplane in the sky? In my classes I take the student on a journey to rediscover the childhood joy of asking 'Why'.

I enjoy science, and when that is evident to students, then they enjoy learning about it. My goal must not be for students to solely complete the work or answer the questions I have thought of. I believe the goal of an educator must be to train the students in independent thinking whereby they will ask questions which have yet to be posed. I am fully at ease with recognizing for many of my students, this may be their last ever science class, and many of my students simply do not like science. These are the students who have forgotten the childhood joy of asking 'Why'. These are the future teachers, journalists, business executives, politicians, voters, tax payers and parents. These are the students in whom I most enjoy fostering a new appreciation of the wonder of the science, and these are the students who often most enjoy the journey I take them on in my classes.

My role is not to teach, rather it is to facilitate an environment of self learning for the students. This requires me to ask the question at the start of each class - Why are these students here? When I was student, I choose to study astrophysics because the vast size and time-scales over which I can research - from milliseconds to Gigayears, from subatomic structures to the distribution of galaxies - can mostly be described by a few basic principals. However I do not expect each student to share this attitude. I approach each class by finding out why each student is taking the course and researching what the students plan to gain from it. Individual students have different abilities and needs, each class will contain a vast range of ability, and each student must obtain a positive experience and achieve their own level of comfort with the subject. By asking myself these questions I have recognized my role, not as teacher, but as a facilitator for learning.

Although the classical didactic method - the teaching of facts - may be the natural basis for all teaching, interactivity is the natural basis for all self-learning. I enjoy facilitating this learning by using every means available, including classical lecturing, interactive techniques, in-class tutorials, audio-visual aids and demonstrations. I encourage students to think quickly during classes and tell me the answer - the 'Pose, Pause, Pounce' approach. This involves asking a question on the subject matter, waiting a few seconds for everyone to consider it, and asking someone at random for an answer. The question is posed in such a way that there is no exact correct answer - the important part is that the thought process reinforces the subject matter for the student. I foster a self-learning environment by breaking lectures into 10-12 minute segments. This adds a natural structure to the course, allows students to refocus during the lecture, and reminds them of the three to four important concepts for each class. I also strongly advocate a degree of future planning by the students through online reading assignments. This forces students to prepare for class and means I can concentrate on the most important key concepts during class.

In summary, in teaching astrophysics I recognize I have the most fortunate position of all academic staff. Firstly, the fundamental technique of science - the scientific method - is the best tested and most successful thought process in existence. Independent of course content, the underlying goal of every science course must be to impress this method upon the students. Secondly, in astrophysics, a student who is purely good at being examined will be outperformed by a student who fully understands the fundamental concepts. My role is to let the student combine the principles and the scientific method, such that astrophysics can be fully understood; not learned.



James McAteer (Assistant Professor)