

# Astronomy 105G: The Planets

## Spring 2009

## Syllabus

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### 1 Overview of the course

This class will deal with the very relevant and beautiful aspects of our solar system. We will journey from planet to planet to moons and to the Sun, uncovering details about many things you have probably always wondered. The first part of the course will concentrate on the fundamentals of astronomy and its history throughout human thought. Then we will try to understand some of the basic physical principles that govern the large-scale behavior of astronomical bodies. Finally, 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.

Some interesting questions you will soon be able to make sense of are: Why does the Earth have seasons, and do all planets? What is Mars, or Jupiter, made of? What is their atmosphere, if any, like? What makes the Sun so hot and violent? Why does the Moon have phases? How big and old is the Universe?

You (we) will make heavy use of the course webpage. You are advised to check it often for all relevant information pertaining to the class. Some extra material will be provided there that does not show up in the lectures, such as worked out problem examples and interesting web links. Announcements will be posted as well for upcoming due dates on assignments. Most importantly, if you would like to work ahead, future reading schedules and assignments will be posted in as timely a manner as possible. I will attempt to put all material in pdf form and/or html, so that you don't need any special software that's not already on most computers.

### Objectives for learning

To do well in this course, all you have to do is (a) show up to class, participate in discussion, and complete your assignments and labs, and (b) always remember that science and astronomy, although sometimes difficult, are fun and exciting and useful and you should want to learn about them. If you do these things then you'll probably do fine on the exams and learn a lot of interesting science. Remember to try to think critically and please do not be afraid to make mistakes or to ask questions— that's how you learn. Do not accept everything simply as truth – come up with questions that might challenge currently accepted theories.

## 2 Details of the course

### Prerequisites

There are no prerequisites for taking this course. Any mathematics you may need will be introduced along the way.

This is a 4 credit course.

### Student expectations

You are expected to come to class, attend and complete all labs, and most importantly, to *participate* in discussions. Reasoned discourse is the best way to formulate and clarify your ideas about something, even if you are wrong. Also, in class you will often have to choose answers to questions I may pose, and for that reason you must bring a voting card<sup>1</sup> (courtesy of Prof. Caroline Simpson) to each class. Please download and print this out in color and keep it with your notebook.

### Textbook and materials

- Textbook: *The Cosmic Perspective, Fourth edition: The Solar System*. Bennett, Donahue, Schneider, Voit. Addison Wesley, 2007. 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.

We will follow the textbook somewhat closely so you are advised to read ahead and read carefully. There are many interesting discussions in the textbook about concepts students are known to have trouble with.

- Lab manual: To obtain the lab manual, you have two options. You can purchase it at the Kinkos near campus for about \$15. Or, you can download it here<sup>2</sup> and then print it out yourself. You can also just print out one lab at a time.
- Course homepage: <http://astronomy.nmsu.edu/jasonj/AST105/>. You will be visiting this page extensively, so it might be a good idea to bookmark it on your home computer. **NOTE**: We will NOT be using WebCT for this course.
- MasteringAstronomy.com: If you purchased a new textbook, an access code to the Mastering Astronomy website<sup>3</sup> 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.
- NASA mission homepage: Find out about your favorite mission here<sup>4</sup>.
- Other useful resources: [astronomynotes.com](http://www.astronomynotes.com)<sup>5</sup>. A website with tons of information and demos for all things astronomy.

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<sup>1</sup><http://astronomy.nmsu.edu/jasonj/AST105/votecard.pdf>

<sup>2</sup><http://astronomy.nmsu.edu/astro/Ast105labmanual.pdf>

<sup>3</sup><http://www.masteringastronomy.com>

<sup>4</sup><http://www.nasa.gov/missions/index.html>

<sup>5</sup><http://www.astronomynotes.com>

## Time and location

Classes will meet on Tuesday and Thursday mornings at 8:55 – 10:10, and are to be held in the Biology Annex (BX) 102. The lab sessions are held Thursday afternoons at 2:30 – 4:30 in room 232 Walden Hall.

## Instructor

Jason Jackiewicz. **Office:** 106 Astronomy building. **email:** jasonj “at” nmsu.edu. **phone:** 575.646.1699.

## Teaching assistant

Cat Wu. **Office:** 121 Astronomy building. **email:** catwu “at” nmsu.edu. **phone:** 575.646.2613. Cat will instruct the labs as well as help out with grading and other course components. Please review her lab syllabus<sup>6</sup>.

## Office hours

My fixed office hours will be 1:30 – 2:30 on Tuesdays and Thursdays. If you cannot make it to see me during these times, come and see me to set up another schedule to accommodate your needs.

Also, you have the opportunity to communicate questions to me by instant messaging from your computer. My screen name is **astr105g** for google chat, yahoo, aim, and **astr105g@live.com** for msn services. If there is an instant messaging service that you use that is not listed here, let us know.

## Labs

Labs are held once per week. The assignments in the lab manual are due at the *beginning* of the following week’s lab class, unless otherwise noted. You must attend all scheduled labs – if you have to miss a lab, please come and see me or Cat at least **1 week** before that lab takes place to schedule a make-up assignment.

You are required to read through the laboratory **before** you arrive to the session, and a short quiz on the material of each week’s lab will be given at the beginning by the TA. Being prepared before you arrive will help both you and the TA get through the lab on time.

The preliminary schedule of the labs is the following:

<b>Jan. 22</b>	Tools for Success in ASTR 105G	<b>Mar. 12</b>	Estimating Earth’s Density
<b>Jan. 29</b>	Density	<b>Mar. 19</b>	Surface of the Moon
<b>Feb. 5</b>	Scale Model of the Solar System	<b>Apr. 2</b>	Surface Water Features on Mars
<b>Feb. 12</b>	Phases of the Moon	<b>Apr. 9</b>	Heat Loss from Io
<b>Feb. 19</b>	The Origin of the Seasons	<b>Apr. 16</b>	Building a Comet
<b>Feb. 26</b>	The Orbit of Mercury	<b>Apr. 23</b>	The Sun
<b>Mar. 5</b>	Kepler’s Laws	<b>Apr. 30</b>	Review

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<sup>6</sup><http://astronomy.nmsu.edu/catwu/ASTR105/>

## Homework

Homework will be assigned on a regular basis and is probably the most important and necessary component of the course to strengthen your understanding of the material. Written assignments will be due at the **beginning** of the lecture on the due date, as will assignments that need to be emailed for credit. **Note:** You will lose 5% each day your assignment is late for the first 2 days, and 10% per day thereafter. Thus, after 6 days your maximum score is only 50% → try to get your homework in on time! Depending on how many homeworks are scheduled, you will have the chance to drop one or two of your lowest scores.

## Quizzes

Once in a while you will be given short quizzes to test a particular idea, and these may be nothing more than a particular homework problem. The quizzes will typically be announced ahead of time, but may be unannounced if I feel that attendance is not what it should be. It is likely you will have the chance to drop your lowest quiz grade.

## Exams

There will be 3 (cumulative) exams during the semester totaling 40% of your final grade. The tentative dates for these exams are indicated in the “important dates” section below.

## Observatory

During the semester you will be given the chance to visit the campus observatory<sup>7</sup> to observe several interesting objects in our solar system and beyond. There will be two separate occasions to view two different sets of objects. It is an exciting opportunity to take advantage of our great facility. These assignments will count toward your lab grade. The schedule of the open hours of the observatory can always be found on its webpage, and is scheduled for Spring 2009 to be Monday and Thursday nights from 9:00 – 10:00 pm.

## Grading

We will follow the following grading scheme:

Homework	25%
Lab exercises	20%
Quizzes	10%
Class participation	5%
Exams (3)	40%

- Note that your class participation is very important for understanding the material. If you are shy and do not enjoy speaking in class, email me your thoughts and questions.
- Results of exams, quizzes, and homeworks may or may not be “curved”: this will be determined on a case-by-case basis. If it is decided that a curve will be used, it will be explained to you when the assignment results are discussed. Note that the plus/minus grading system will be used for your final grades: A (>92), A<sup>-</sup> (90-92), B<sup>+</sup> (87-89), B (83-86), B<sup>-</sup> (80-82), C<sup>+</sup> (77-79), C (73-76), C<sup>-</sup> (70-72), D<sup>+</sup> (67-69), D (63-66), D<sup>-</sup> (60-62), and F (<60).

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<sup>7</sup><http://astronomy.nmsu.edu/astro/observatory/>

## Important dates

- **February 26:** First EXAM (tentative)<sup>8</sup>
- **March 9:** Last day to drop course with “W”
- **March 23 – 27:** Spring break - no classes
- **April 14:** Second EXAM<sup>8</sup>
- **May 7:** FINAL EXAM: 8am – 10am

## Other policies and notices

1. Attendance to the lectures is strongly encouraged. Attendance will be taken at each class and will be used to determine a student’s credit when the time comes to submit final grades. It would be very courteous to let me 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 any unannounced “pop” quizzes. **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. You must enlist in one of the lab classes – it is mandatory.
3. The last day to drop a course with a “withdrawal” is Wednesday, March 9, 2009.
4. Cellphones must be turned off for the duration of the class period. Laptops will only 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.
5. Cheating and plagiarism, while not only uncool, unfair, and unnecessary, will be punishable according to the procedures demanded by the University and spelled out clearly in the student code of conduct handbook<sup>9</sup>. The penalties<sup>10</sup> are severe and not worth it, so just simply do not cheat or plagiarize. When in doubt, give credit by appropriate citation.
6. If you have any problems whatsoever – grading mistakes, attendance issues, anything – just come see me and we’ll try to work things out.
7. Official communication to you will often come through your NMSU e-mail. 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.
8. Feel free to call Jerry Nevarez, 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.
9. Feel Free to call Michael Armendariz, 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.

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<sup>8</sup>Subject to change

<sup>9</sup><http://www.nmsu.edu/%7Evpsa/SCOC/misconduct.html>

<sup>10</sup><http://www.nmsu.edu/%7Evpsa/SCOC/actions.html>

### 3 Topics to be covered in the lectures

Below is a list of the main topics that will be encountered in the course and the approximate time frame. The detailed course schedule, along with all assignments and pdf files of course lectures, can always be found at this link<sup>11</sup> on the course homepage. Please check that page often.

- Weeks 1 – 2: Introduction, overview of the universe, large scales, Earth’s movement through the universe, understanding the night sky
- Week 3: Season on Earth, phases of the Moon, eclipses, historical astronomy
- Week 4: Early astronomy, Ptolemy, Copernicus, Kepler, Galileo
- Week 5: Newton’s laws, gravitation, energy
- Week 6: Properties of electromagnetic radiation (light)
- Week 7 Learning from light, possible EXAM
- Week 8: Telescopes, observations
- Week 9: Our solar system basics, structure and formation theories
- Weeks 10 – 11: Geology of the inner planets
- Week 12: Atmospheres of inner planets
- Week 13: Outer planets, possible EXAM
- Week 14: Outer planetary systems and moons
- Week 15: The Sun

If time permits and this schedule is accelerated, we will talk about comets and asteroids in detail.

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<sup>11</sup><http://astronomy.nmsu.edu/jasonj/AST105/classnotes.html>