

Syllabus

Astronomy 381

PLANETARY ASTROPHYSICS

COURSE:

Meeting Times: Monday, Wednesday and Friday 9-9:50am

Location: RLM 15.216B

Unique number: 48615

Website: All course materials will be posted on Blackboard

INSTRUCTOR:

Dr. William Cochran

Research Professor, Department of Astronomy

Office: RLM 16.342

Phone: 512-471-6474

Email: wdc@astro.as.utexas.edu

OFFICE HOURS:

Monday 10:00-11:00am

Wednesday 10:00-11:00am

or: by appointment

or: drop in

COURSE DESCRIPTION

This course will attempt to introduce the physics of planetary systems. Because the topic is so large, it will be completely impossible to cover everything in just one semester. Thus, we will instead cover “selected topics” in planetary astrophysics. A tentative course schedule is given at the end of this syllabus, but it will almost certainly change and evolve as the course progresses. *If there are particular topics that you would like to see covered that are not on the tentative course schedule, please let me know!!* I consider it very important to cover the topics that you, the students, want to learn. I intend to interweave the study of our own solar system with the study of exoplanets. After all, they share a common underlying physics and chemistry.

TEXTBOOK

We will use *Planetary Sciences (second edition)* by Imke de Pater and Jack J. Lissauer as the primary text for the class. Please purchase this book. We will also utilize *Lecture notes on the formation and early evolution of planetary systems* by Phil Armitage. Fortunately this is available on-line at <http://arxiv.org/abs/astro-ph/0701485>, and will also be in the “Course Documents” portion of Blackboard.

OTHER RESOURCES

Annual Reviews of Astronomy and Astrophysics

Annual Reviews of Planetary Science

(Selected papers from these sources will be posted in the “Course Documents” section of Blackboard.)

GRADES

The grading system for this course is designed to encourage you to develop and refine the skills you will need to be successful as a professional astrophysicist. Thus, homework may be given but will not be emphasized. Instead, much more importance will be placed on your ability to present ideas and concepts to your colleagues in the form of both written and oral communications, to participate knowledgeably in discussions of ideas, and to answer oral questions. The oral final examination will help you become accustomed to this style of exam and will help prepare you for your second year qualifying examination.

- Class participation and discussion: 30%
- Class Presentations and Papers: 2 presentations, each worth 20% (see below)
- Oral Final Exam: 30%

CLASS PRESENTATIONS and PAPERS

Each student taking the class for credit is expected to give two in-class presentations on topics in planetary astrophysics that they have selected. Each presentation should occupy approximately 1/3 to 1/2 of a class period (i.e. around 15-20 minutes).

A formal write-up of the presentation will be due at the class meeting following your presentation. This should be 5-10 pages (double spaced). It should cover the background, give a detailed development of the topic, and give conclusions and a complete reference list. The style should be similar to that of a scientific review paper.

Students who are auditing the class are encouraged (but not required) to give a presentation but are exempted from needing to write a paper.

You should consult with me about the topics you select. Some possible suggestions are given below. You are also strongly encouraged to explore topics of personal interest.

²⁶Al, and other “live” radionuclides in the early solar system

Determination of the age of the Solar System

The formation of chondrules

The solar birth environment

The “Nice Model” and the “Grand Tack”

Super Earths: stripped Neptunes or obese terrestrial planets?
The Earth's carbonate-silicate cycle
Survival of planets through late stages of stellar evolution
Pulsar planets
Transit Timing Variations
A Warm and Wet Early Mars?
Future Direct Detection and Characterization of Exoplanets from Space
Formation of Earth's Moon
Late Heavy Bombardment

Guest Lecturers

I have other demands that will force me to be out of town 7-11 October, 4-8 November and 13 November. I will arrange for other people to teach the class on those dates. *You are still expected to attend class on those dates!*

Accommodation of Student Absences

I fully recognize that graduate students will sometimes need to miss class because of their other responsibilities. I am very willing to work with students who must miss classes due to such things as religious holidays (see below), attendance at scientific meetings, or trips to Observatories. However, *please notify me well in advance of any such absence*. I will **not** accommodate absences after the fact, except in the case of documented illness.

Accommodations for students with disabilities

At the beginning of the semester, students with disabilities who need special accommodations should notify the instructor by presenting a letter prepared by the Service for Students with Disabilities (SSD) Office. The University of Texas provides upon request appropriate academic accommodations for qualified students with disabilities. To ensure that the most appropriate accommodations can be provided, students should contact the SSD Office at 512-471-6259 or Videophone 512-410-6644.

Religious Holidays

University of Texas policy states: "A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence." Therefore, I request that you notify me at least fourteen days in advance of any planned absence for a religious holiday. For religious holidays that fall within the first two weeks of the semester, I request that you notify me immediately at the start of the semester.