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Fall 9-1-2000

ASTR 351.01: Planetary Science

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ASTRONOMY 351/GEOLOGY 309
PLANETARY SCIENCE
Fall 2000

Meets MWF 10:10 - 11:00 in SC 230/231

INSTRUCTORS: Dave Friend (dbfriend@selway) and Jim Sears (jwsears@selway)

Offices: Dave: SC 127, ext. 5283

Jim: SC 371, ext. 5251

Office Hours: Dave: M 1:10-2:00, TTh 11:10-12:00, W 9:10-10:00, F 2:10-3:00

Jim: MWF 11:10-12:00, Th 2:10-3:00

TEXT: *Moons and Planets* (4th edition, 1999), by William K. Hartmann

OPTIONAL: *Stardust to Planets* (1993), by Harry Y. McSween

Other books of interest (available in the library):

Origin and Evolution of Planetary and Satellite Atmospheres by Atreya et al.

The New Solar System by Beatty and Chaikin

Worlds Apart - A Textbook in Planetary Sciences by Consolmagno and Schafer

Introduction to Planetary Geology by Glass

Planetary Landscapes by Greeley

The Grand Tour by Hartmann and Miller

Planetary Science - A Lunar Perspective by Taylor

Solar System Evolution - A New Perspective by Taylor

The Solar System by Wood

COURSE CONTENT AND GRADING:

In this course we will take an in-depth look at the planets and moons of our solar system. We will start (after a general overview) by considering celestial mechanics, the study of gravity and orbits. We will then discuss the origin of the solar system, the formation of planets and moons, and small bodies in the solar system. Most of the course will be spent on the three major aspects of planets and moons: interiors, surfaces, and atmospheres. We will concentrate on the physical and geological processes involved, and use a comparative approach rather than considering each planet as a separate entity. Our study of the planets will be fairly quantitative: we will use some basic physics and elementary calculus.

EXAMS: There will be two mid-term exams and a final exam. The final, which will be on Friday, December 22nd, at 8:00 AM, will be comprehensive, but will emphasize the material in the last part of the course. Exams will contain both mathematical problems and qualitative questions.

HOMEWORK ASSIGNMENTS: There will be about 7 homework assignments, which will give you some practical experience with quantitative astronomy problems and with the geological processes which affect the planets. These assignments will constitute a substantial fraction of your grade.

RESEARCH PAPERS: At the end of the semester, each student will be required to submit a 5 - 10 page paper on some topic in planetary science. We will ask for a brief outline of your paper roughly a month before the end of the semester to make sure that everyone has chosen an appropriate topic. As an alternative to writing the research paper, you may choose instead to give a half-lecture (roughly 25 minutes) on an approved topic in planetary science during the next to last week of the course.

GRADING: final grades will be calculated according to the following percentages:

first exam	20%
second exam	20%
final exam	25%
homework assignments	20%
research paper (or half-lecture)	15%

COURSE OUTLINE

week of	main topics	readings in text
Sep. 4	introduction; survey of the planets; terminology	ch. 1, 2
11	celestial mechanics: orbits	ch. 3
18	celestial mechanics: 3-body effects	ch. 3
25	origin of the sun and the solar system	ch. 4
Oct. 2	formation of planets and moons	ch. 5
6	FIRST EXAM	
9	meteorites	ch. 6
16	asteroids and comets	ch. 7
23	planetary interiors: basic processes	ch. 8
30	planetary interiors: terrestrial vs. Jovian	ch. 8
Nov. 6	SECOND EXAM	
8	planetary surfaces: composition (Friday holiday)	ch. 9
13	impacts and the cratering process	ch. 9
20	surface evolution: volcanism (Wed., Fri. holidays)	ch. 10
27	surface evolution: tectonics; specific landforms	ch. 10
Dec. 4	details of specific planets (student lectures)	ch. 13?
11	planetary atmospheres: origin and basic physics	ch. 11
22	FINAL EXAM FROM 8:00 TO 10:00	