Astronomy 121 – Course Information
(http://www.uoregon.edu/~haydock/Astr121Info.htm)

The Solar System CRN 35833 April 2, 2007

This first term of introductory astronomy covers the early history of astronomy, the origin of the solar system, and what is known about the Sun, Earth, Moon, and other planets. This course requires minimal mathematics – some arithmetic and a little algebra.

Classes: Mondays, Wednesdays and Fridays 11:00 to 11:50 in Room 123 Pacific.

Instructor: Roger Haydock (haydock@uoregon.edu), 172 Willamette Hall, 346-5221. Office hours – Tuesdays 08:00 to 09:00, Thursdays 09:00 to 10:00, or by appointment.

Assistants: Mary Robinson (mrobinso@uoregon.edu), 217 Willamette Hall, 346-4793. Office hours – Thursdays 08:00 to 09:00. Vladimir Tskhvaradze (vtskhvar@uoregon.edu), 231 Willamette Hall, 346-5086, Office hours – Tuesdays 09:00 to 10:00.


Alternative: Instead of buying the text, students may choose to attend all classes and take thorough notes. Review and Discussion questions and Problems will be posted at the above website. Approval from the instructor is required for this option.

Homework: Prepare for each class by reading the assigned material in the text and answering the appropriate questions from the self-tests. After class reread the material and write out the answers to the questions on that material in Review and Discussion. Try a few of the relevant Problems. Be sure to use complete sentences as well as diagrams and formulas in answering the questions and problems. You should be spending about 6 hours per week, outside of class, studying the text, answering questions, and solving problems. This homework will not be collected, but the examinations will consist of questions from the homework.

Midterms: Friday, April 20, and Friday, May 11, there will be midterms in class. Each midterm will consist of ten questions similar to Review and Discussion questions or the simpler Problems from the homework. The purpose of the midterms is to tell you how you are progressing with the course. Only your midterms which are better than your final examination will be averaged into your final grade.

Final Exam: Wednesday, 13 June, at 10:15 in Room 123 Pacific is required for a pass or a grade. This examination will consist of twenty questions similar to Review and Discussion questions or the simpler Problems from the homework.

Project: Because this is a four credit course meeting three hours per week, each student is required to plan, conduct and report on a quantitative determination of some astronomical quantity relevant to the course. Examples of the kind of observations appropriate for this project are measurement of positions at various times for the sun, moon, satellites, or planets. Other kinds of observations are possible, but should be discussed in advance with the Instructor. Examples of quantities to be determined in these projects are rotational tilt, orbita periods, or inclination of the Earth, Moon, other planets, satellites, and so forth. Again, other ideas are encouraged but should be discussed in advance with the Instructor. Data obtained other than by direct observation, for example data downloaded from the internet, is not acceptable.

The grade for each project will be based on a written report, due at the final

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exam, of not more than 1,000 words, but which may contain sketches, graphs, photographs, equations, and so forth. Reports should be written so as to be understandable to other members of the class and should include an introduction to the principle being tested, a description of how the observations were made, the data obtained, and a discussion of whether or not the results agree with accepted values of the quantity being determined.

The total effort on the project should be about 3 hours per week, or a total of 30 hours for the course.

Grading: The Final grade is 75% Exams + 25% Project. The exam grade is the average (weighting individual questions equally) of the Final Exam and any Midterms which were better than the Final. The principle for grading exams is that demonstration of understanding of 2/3 or more of the material is at least an A-, ½ or more at least a B-, and 1/3 or more at least a C-. The project is graded on the principle that a coherent report reflecting 30 hours of effort earns a B (A if the project is outstanding in some respect).


Course Plan

April
2
Introduction to the Solar System
Chapter 1
4
Basic Astronomy
Chapter 2
6
Ancient Astronomy
Chapter 2
9
Modern Astronomy
Chapter 2
11
Origin of the Solar System
Chapter 15
13
Formation of the Planets
Chapter 15
16
Planetology
Chapter 6
18
Exploration of the Solar System

First Midterm covering Chapters 1, 2, 15 and 6

23
The Outer Earth
Chapter 7
25
The Inner Earth
Chapter 7
27
The Moon
Chapter 8
30
Mercury

May
2
The Planet Venus
Chapter 9
4
The Atmosphere and Surface of Venus
Chapter 9
7
The Planet Mars
Chapter 10
9
The Atmosphere and Surface of Mars
Chapter 10
11
Second Midterm covering Chapters 7, 8, 9, and 10
14
Jupiter
Chapter 11
16
The Moons of Jupiter
Chapter 11
18
Saturn
Chapter 12
21
The Rings and Moons of Saturn
Chapter 12
23
Uranus
Chapter 13
25
Neptune and Pluto

June
28
Memorial Day Holiday – no class

30
Asteroids
Chapter 14

June
1
Comets
4
Review I
6
Review II
8
Review III
13
Final Exam at 10:15 in Room 123 Pacific covering Chapters 1, 2, 6-15.
The Solar System – ASTR 121
First Midterm – April 20, 2007, 11:00-11:50

Instructions: Print your name and student identification number at the top of this page. Answer each of the questions A through G in the space provided. Be clear and thorough in your answers using sentences, sketches, and formulas where appropriate. The questions have different values, given in parentheses.

A. How far away is an errant asteroid when its parallax angle is 2 seconds of arc across a baseline of 1000 km? (2 points)

B. Briefly describe the Copernican model and its main flaw. (2 points)

C. State Kepler’s three laws of planetary motion. (6 points)
D. Describe four properties of the solar system any model of its formation must explain. (4 points)

E. What is a ‘hot Jupiter’? (2 points)

F. Describe two important differences between Terrestrial and Jovian planets. (2 points)

G. Why has knowledge of the Solar System increased greatly in the last 50 years? (2 points)
A. Explain how the Moon produces two high tides per day on Earth. (2 points)

B. Give two reasons for thinking that the Earth’s inner core is liquid. (2 points)

C. What does it mean to say that Mercury is in a 3:2 spin-orbit resonance? (2 points)

D. Describe the generally accepted theory of the Moon’s origin, mentioning the important facts it explains. (4 points)
E. Given that Venus has a partially melted core like the Earth, why doesn't it have a magnetic field like Earth's? (2 points)

F. Describe two ways in which the atmosphere of Venus differs from that of the Earth. (2 points)

G. Why is Mars red, and what does it tell us about the extent to which Mars melted in the past? (2 points)

H. What are the main similarities and differences between the atmospheres of Mars and Venus? (2 points)

I. Mercury has a radius about 1/3 Earth's, and a mass about 1/20 Earth's; what is its density relative to the Earth's? (2 points)
The Solar System – ASTR 121
Final Exam – June 13, 2007, 10:15-12:15

Instructions: Print your name and student identification number at the top of this page. Answer each of the questions A through T in the space provided. Be clear and thorough in your answers using sentences, sketches, and formulas where appropriate. Every question is worth 2 points.


B. What influence did the Earth’s position in the Solar nebula have on our planet’s final composition?

C. Why are there leap years?

D. What are the two most noticeable effects of Rayleigh scattering for us on Earth?

E. By comparison with its average density, what do the densities of water and Earth’s crust tell us about its interior?

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F. What process is responsible for the large-scale features on the Earth's surface (mountains, oceanic trenches, and so forth)?

G. How did the Moon's rotation come to be synchronous with its orbit?

H. Why did early astronomers think that Mercury was two separate planets?

I. What is the evidence for active volcanoes on Venus?

J. What are the two main constituents of Venus's atmosphere?

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K. Describe two pieces of evidence that Mars never melted as extensively as did Earth.

L. Is there water on Mars today in any form? Explain.

M. What does Jupiter's degree of flattening (oblateness) tell us about its interior?

N. How does the density of the Galilean moons vary with distance from Jupiter?

O. Why does Saturn have a less varied appearance than Jupiter?

Continued on Back
P. What would happen to a satellite if it came too close to Saturn?

Q. Describe a day on Titania, a major moon of Uranus.

R. Will Pluto and Neptune ever collide? Explain.

S. How did the Kirkwood gaps form in the Asteroid belt?

T. What causes a meteor shower?