

## Astronomy 311 - Planetary Physics - Fall 2012

**Course Overview** AS 311 is the follow-on to AS 202 for Physics-Astronomy majors. In this course we will dig deeper into the details of planetary science, which combines physics, mathematics, geology, chemistry, and some biology. In addition to a more in-depth look at physical processes in the solar system and outstanding scientific questions, this course will give you practice in applying principles of math and physics to real-world applications.

**Professor:** John T. Clarke jclarke@bu.edu CAS Building, Room 400 617-353-0247

<b>Lectures:</b>	Tuesday	12:30 - 2:00 p.m.	Room 502 CAS Building
	Thursday	12:30 - 2:00 p.m.	"
<b>Discussion:</b>	Friday	noon - 1:00 p.m.	"

**Office Hours:** will be in CAS Rm 400:

Mon 2:00 - 4:00 p.m.	Tues. 2 - 4 p.m.
Thurs. 3:00 - 4:00 p.m.	Fri. 9:30 - 11 a.m.

- feel free to send questions and comments by e-mail!

*All course information* can be accessed through the **BU Blackboard** web page ([blackboard.bu.edu](http://blackboard.bu.edu)). This will be the source of schedules, notices, homework assignments, and supplementary material for this course. Everyone enrolled in the course can access the pages for AS311 by logging in with your BU username and Kerberos password.

**Required Text:** *Planetary Sciences*, I. de Pater & J. Lissauer (Cambridge Univ Press), 2<sup>nd</sup> edition, (available at Barnes and Noble BU bookstore and other sites online)

**Recommended:** *Moons & Planets*, W.K. Hartmann, Wadsworth, 5<sup>th</sup> Edition, 2004  
*Introductory Astronomy & Astrophysics*, 4<sup>th</sup> Edition, M. Zeilik and S. Gregory  
*Physics and Chemistry of the Solar System*, John S. Lewis  
*Planetary Atmospheres*, R. Goody & Walker, 1972  
*The New Solar System*, K. Beatty, Petersen, and Chaikin, 1999

**Lectures and Discussion Section:** The class will meet twice a week for lectures and once for discussion. The lectures will be primarily to present new material and answer questions from the previous lecture. The discussion section on Friday at noon will be mainly to work out problems together. It will also be used to hand back and discuss assignments; to discuss the project assignment; to review for exams; and to discuss any questions or issues you want to raise. Occasionally that time may be used for a make-up lecture (with advance notice). It is important that you attend these sessions.

**Topics:** As listed in the lecture and topic schedule below, the material will be presented in the order: orbital motions, solar system formation, planetary interiors and magnetospheres, planetary surfaces, and planetary atmospheres. The general principles in each subject area will be discussed with examples from various solar system bodies, and we will leave time at the end of the term to discuss applications to extra-solar planetary systems.

**Homework:** Homework sets will be assigned from the course web site, with due dates listed in the schedule below. Since solutions will be presented in class, no credit will be given for assignments handed in late. You are welcome to work with others on the homework, the homework is mainly for your benefit to keep up with the material. However, each student must hand in their own work in their own writing. Paper copies of your homework must be handed in, no electronic files unless specifically indicated in the assignment.

**Course Project:** Each of you will join a team of up to three people from the class to perform a more detailed study of one outstanding scientific question in planetary science. The results of these studies will be presented to the class at the end of the term. Part of the class time near the end will be spent discussing the format of the research projects. Each of you will independently write up and submit a short summary of your contribution to your project in your own words.

**Course Rules:** Please note the schedule for registration and other important dates at <http://www.bu.edu/reg/dates>, and the Academic Conduct Code at <http://www.bu.edu/academics/resources/academic-conduct-code/>. All Academic Conduct Code policies will be followed in this course unless stated otherwise. Note also the Rules of the Road document on the course web site, which gives more specific information about this course.

**Course Grading:**

Homework sets	30 % of grade
Hourly exams	30 % of grade
Class Project	15 % of grade
Final Exam	25 % of grade

The **lecture schedule** is given on the next page. Dates marked \* are when Prof. Clarke will be out of town. This schedule will be updated as needed over the course of the semester. *Note the dates of the two hourly exams and the final exam, these will not be changed.*

## AS 311 Lecture and Topic Schedule Fall 2012 (subject to updates)

T 4 Sept.		Course Introduction & Overview	
H 6 Sept.		Kepler's and Newton's Laws	
F 7 Sept.		Discussion and Evaluation	
T 11 Sept.		Celestial Mechanics & Orbital Motion	
H 13 Sept.		Missions to Other Planets	
F 14 Sept.		Discussion & LaGrange points	HW #1 Due
T 18 Sept.		Tidal Forces & Resonances	
H 20 Sept.		Solar System Formation	
F 21 Sept.		Discussion	HW #2 Due
T 25 Sept.	*	Energy and Collapse of Proto-Solar Nebula	
H 27 Sept.		Planet Formation and Interiors	
F 28 Sept.		Discussion	HW #3 Due
T 2 Oct.		Properties of Planet Interiors	
H 4 Oct.		Planet Interiors	
F 5 Oct.		Review for Exam	HW #4 Due
T 9 Oct.		<i>No class - Mon schedule</i>	
H 11 Oct.	*	<b>Hourly Exam #1</b>	
F 12 Oct.	*	<i>No Discussion</i>	
T 16 Oct.	*	Planetary Magnetic Fields	
H 18 Oct.		Planetary Magnetospheres	
F 19 Oct.		Discussion	HW #5 Due
T 23 Oct.		Terrestrial Planet Geology	
H 25 Oct.		Cratering and Volcanism	
F 26 Oct.		Discussion	HW #6 Due
T 30 Oct.		Mars/Venus Geology	
H 1 Nov.		Planetary Satellite Geology	
F 2 Nov.		Discussion	HW #7 Due
T 6 Nov.		Principles of Atmospheric Structure	
H 8 Nov.		Atmospheric Thermodynamics	
F 9 Nov.		Discussion of Potential Class Projects	HW #8 Due
T 13 Nov.		Terrestrial Planet Atmospheres	
H 15 Nov.		Giant Planet and Satellite Atmospheres	
F 16 Nov.		Review for Exam	
T 20 Nov.		<b>Hourly Exam #2</b>	
H 22 Nov.		<i>Thanksgiving - no class</i>	
F 23 Nov.		<i>Holiday - no class</i>	
T 27 Nov.		Global Warming and Climate Change	
H 29 Nov.		Climate Change and Terraforming Mars	
F 30 Nov.		Discussion	HW #9 Due
T 4 Dec.	*	Extra-Solar Planetary Systems	
H 6 Dec.		Class Project Presentations I	
F 7 Dec.		Review for Final Exam	
T 11 Dec.		Class Project Presentations II	
T 18 Dec.		<b>Final Exam</b> 12:30p.m. - 2:30p.m.	<b>CAS room 522</b>

\* - Prof. Clarke will be out of town, classes will still be held.