

PTYS 411/511
Geology and Geophysics of the Solar System
Syllabus – Fall 2007

Professor Shane Byrne
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Times and locations:

- Two lectures per week on Tuesday and Thursday from 2pm to 3:15pm.
- First lecture on Tuesday, August 21st.
- Lectures will be held in room 312 of the Kuiper Space Sciences building.

Professor Byrne will be available for questions and discussion, from the end of each lecture at 3:15pm, until 5pm on both Tuesdays and Thursdays. If you need help and cannot make these times then please contact him by email to make another arrangement.

What students should know coming into this course:

There are no explicit course prerequisites and anyone may enroll; however, this course is intended for advanced undergraduate and beginning graduate students and as such contains advanced material. Many of the lectures will contain material of a mathematical nature and at least a basic knowledge of calculus will be necessary to understand it. Some background knowledge of terrestrial geology would be of great benefit. Students may attempt the course without a mathematical or geological background, although extra effort will be required on their part.

Please speak to the instructor if you have any questions.

What students should know coming out of this course:

The goals of this course are to give the student a thorough understanding of geologic processes operating on planetary bodies and how they have shaped the geologic history of solar system bodies. Some of the material covered may be considered by some to be more geophysics than geology, but this material is also necessary to fully understand how planetary surfaces have evolved over time.

In this class we will explore how a variety of geologic processes, such as impact cratering, volcanism, tectonics, fluvial and atmospheric, shape planetary landscapes. Interspaced with these lectures we will review the geologic history of solar system bodies and processes unique to these individual bodies.

Textbooks:

There are no required textbooks in this class. Any reading assigned will be provided by the instructor in hardcopy or electronic form. The optional textbook "The new solar system", edited by Beatty, Peterson and Chaikin, is recommended as good background reading.

Course Website:

Lectures, homework assignments and general information on the course will be posted on a class website at:

http://www.lpl.arizona.edu/~shane/PTYS_411_511

Course credit:

There will be no final or mid-term exam in this course.

Homework will be assigned every two weeks in class on Thursdays. In general, this homework will be due two weeks from the date on which it is assigned. Some of these assignments will be based on analysis of spacecraft data and will require students to utilize the computational resources here at the Lunar and Planetary Laboratory. Grades of homework submitted late will be reduced by 10% for each day it was overdue with no credit for homework submitted a week or more after the due date. If you are unable to complete a homework assignment on time (and have a very good reason) you must discuss this with the instructor *before* the due date to avoid losing credit.

A final course project will be required of all students on some subject relevant to the content of the course. Students are encouraged to interact with the instructor early in the semester to choose a topic for their project. A 10-15 minute oral presentation and written report on this project will be due at the end of the semester.

The class is offered to both graduate and undergraduate students and all students are expected to attend all lectures. However, there are important differences in expectations between graduates (taking PTYS 511) and undergraduates (taking PTYS 411).

- Additional questions will appear on the homework sets for graduate students, undergraduates may optionally complete these for extra credit.
- The final project for undergraduate students may be a (thorough) literature review of their chosen topic. However, graduate students are expected to contribute some original piece of research in addition to understanding the literature on their topic. Undergraduates may also contribute original research in their projects for extra credit.

Grading policy:

Final grades for both graduates and undergraduates are determined from:

Homework assignments	60%
Final project – Oral presentation	20%
Final project – Written report	20%

Grades will be assigned according to the following scale.

90-100%	A
75-89%	B
60-74%	C
50-59%	D
0-49%	E

Grades will not be rescaled to ensure that any particular statistical distribution is met.

General Policies:

Attendance is required from all students at all lectures. While in class, students are expected to conduct themselves in a considerate manner. Late arrivals and early departures from class are disruptive and not permitted. Students must disable cell phones for the duration of the class and refrain from answering calls (please take any emergency calls outside and explain them later). Students that persistently disrupt the class may be removed through the administrative drop procedure.

Students are encouraged to discuss approaches to solving homework problems and their class projects with each other; however, all work submitted must be the student's own. Copying of homework from other students, or text from previously published papers without reference, is not acceptable. Previously completed course projects may not be submitted for credit in this course. Plagiarism of published research for a class project will result in zero credit for that portion of the course.

The classroom is a communal resource that should be treated with care and respect. No food or drink (except water) is permitted in this room. Please clear up your seating area after use and don't leave any debris that others will need to clean up.

Course outline:

The planned course outline is copied below. This schedule may be altered during the course to include specific topics of interest.

PTYS 411/511, Fall 2007

WEEK	DATE	TOPIC
1	08/21/2007	Introduction to the course Solar system formation and the bodies we see today
	08/23/2007	Impact cratering – Mechanics and crater morphologies
2	08/28/2007	Impact cratering – Age dating and the planetary record
	08/30/2007	Surface processes acting on airless bodies
3	09/04/2007	Volcanic processes
	09/06/2007	Tectonic processes
4	09/11/2007	Geologic history of the Moon
	09/13/2007	Geologic history of Mercury
5	09/18/2007	Fluvial processes
	09/20/2007	Atmospheric processes
6	09/25/2007	Geologic history of Venus
	09/27/2007	Geologic history of Earth – Plate Tectonics
7	10/02/2007	Geologic history of Earth – Origins and effects of life
	10/04/2007	Planetary Ices
8	10/09/2007	Mars – Early history
	10/11/2007	Mars – The middle years
9	10/16/2007	Mars – Recent activity and the current epoch
	10/18/2007	Interpretation of gravity and topography data
10	10/23/2007	Planetary heating – Internal and external
	10/25/2007	The surfaces of asteroids and the meteoritic record
11	10/30/2007	Io and Europa
	11/01/2007	Ganymede and Callisto
12	11/06/2007	Rings and moons of the Saturnian system
	11/08/2007	Titan
13	11/13/2007	Icy moons of Uranus and Neptune
	11/15/2007	Eris, Pluto, Charon and the rest of the Kuiper belt
14	11/20/2007	Extra-solar planetary systems
	11/22/2007	THANKSGIVING – NO CLASS
15	11/27/2007	Student presentations and discussion
	11/29/2007	Student presentations and discussion
16	12/04/2007	Student presentations and discussion
	12/06/2007	UA READING DAY – NO CLASS
UA EXAM WEEK – NO CLASSES – FINAL REPORTS DUE MONDAY 12/10		