

GEOLOGY 43xx/5308/6315: Planetary Geology and Exploration
University of Texas at El Paso
Department of Geological Sciences
Spring Semester 2014

Instructor:

Dr. Jose Miguel Hurtado, Jr.
Geology room 301A
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Class Website:

<http://www.geo.utep.edu/pub/hurtado/planetary>

Class Meetings:

Lecture/Lab: MW 11 am-12:20 pm, Geology 320
Office Hours: T 12 pm-4 pm (or by appointment), Geology 301A

Text:

There is no required text to purchase. Students will be given required readings from a variety of published books and current articles in professional journals as PDFs for download from the class website. In addition, a selection of textbooks and reference materials will be available for your use in room 320 – they are the instructors' personal property, and they are NOT to leave the room, except (briefly) for photocopying. Materials will also be drawn from selected internet sites, including the websites for current and past NASA exploration missions, the Planetary Data System (PDS), and other agencies.

Grading:

Grades will be based on cumulative points earned from: assignments/labs (55% total), in-class quizzes and paper discussions/participation (15%), final exam (15%), and a final project (15%).

Graduate students will be held to a higher standard than undergraduate students, and they can expect additional tasks on assignments, quizzes, paper discussions, and exams, including leading in-class discussions and/or making class presentations.

Policies:

Please contact the instructor about any concerns, schedule conflicts, missed work, etc. **in advance** or otherwise **as soon as possible!** *Valid excuses include illness, absence with the instructor's prior approval, official University business, etc., but all require documentation.* Otherwise, there are **no make-ups** for missed work, and **late work will lose 50% of its value for each day it is late!** **Attendance and participation are mandatory, and excessive absences may result in being dropped from the course!** Do each reading assignment before attending class and come to class prepared with questions. I expect **everyone** to contribute to class discussions.

Your continued enrollment in this course implies your acceptance of the policies set by the instructor!

If you are in the military with the potential of being called to military service and/or training during the course of the semester, you are encouraged to contact the instructor as soon as possible. If you think you may have a disability or if you are experiencing learning difficulties, please contact the Disabled Student Services Office (DSSO) at (915) 747-5148. They're located in Union East room 106 or you can reach them by e-mail at dss@utep.edu. The student is responsible for presenting to the instructor any DSS accommodation letters and instructions.

Reasonable collaboration is allowed on assignments (not exams). However, **I expect everyone to turn in work that is his or her own!** *You MUST learn to trust your own observations and NOT rely on the interpretations of others; otherwise you are wasting your time. The assignments are your opportunity to learn the material. Show all your work and be prepared to explain it! Cheating WILL be noticed and WILL NOT be tolerated. The University guidelines for academic dishonesty are very specific and will be strictly followed. Please read the guidelines (see <http://studentaffairs.utep.edu/dos>), and contact the Dean of Students or the instructors if you have any concerns.*

Because they are vital venues for all course business, **computer and internet use outside of class are required.** You need to have your free UTEP email account activated for this course and you need to check it regularly. If you do not have one, go to <https://newaccount.utep.edu/> to activate yours. **You will also be expected to stay continually up to date with all information posted on the course website, which will include course notes, readings, supplemental material, and assignments.** I may be experimenting with internet activities this semester so the syllabus may change as the class evolves.

Course Description:

A survey of a broad range of topics in lunar and planetary science, including the origin, evolution, and present state of the planets of our solar system. The focus of the class will be on process, as well as phenomenology, and, in particular, a quantitative understanding of important planetary processes, including tectonic activity, volcanism, surface dynamics, and atmospheric processes throughout the solar system. We will discuss the geologic properties of and contrasts among the terrestrial, rocky planets (Earth, the Moon, Venus, Mars, Mercury), the characteristics of the gas giant planets (Jupiter, Saturn, Uranus, Neptune), and the wide array of planetary moons and other small bodies. Planetary ages, derived from impact cratering records and other methods, and remotely-sensed data derived from robotic probes (i.e., composition, magnetic and other fields, atmospheric conditions, imagery) will be presented and the students will gain experience with working with those data. In addition, this course will cover material relating to asteroids, comets, extra-solar planets, astrobiology, and constraints on the origin and fate of the solar system. An ongoing emphasis will be on the technology and science behind the robotic and human exploration of the solar system in the form of a semester project.

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Course Outline (subject to continual change!):

Notes: No class on Jan. 20 (MLK Day); Mar. 10, 12 (Spring Break); Mar. 17, 19 (LPSC), Apr. 14, 16 (JMH in field)
Standing assignments include weekly (W) discussion of journal articles and/or current events as well as four, short research assignments

<u>Week</u>	<u>Dates</u>	<u>Topics and Labs</u>
I. INTRODUCTION		
Week 1	Jan. 22	Stellar evolution and nucleosynthesis; Planet formation Lab 1: Differentiation
Week 2	Jan. 27, 29	Planetary dynamics and physics; orbital mechanics Lab 2: Kepler's Laws and Gravitation
Week 3	Feb. 3, 5	Our Sun; Overview of the solar system Lab 3: Planetary Properties Research Assignment 1 due
II. IMPACTS		
Week 4	Feb. 10, 12	Meteorites, asteroids, and comets Lab 4: Impacts: Analog and Numerical Experiments
Week 5	Feb. 17, 19	The impact process Lab 5: Impacts: Crater Counting and Geochronology
Week 6	Feb. 24, 26	Impact landforms and geology Lab 6: Image Interpretation I – Geologic Mapping (Moon) Research Assignment 2 due
Feb./March/April TBD: NASA Lunar Rocks & Meteorites; NASA Lunar & Meteorite Thin Sections		
III. VOLCANISM		
Week 7	Mar. 3, 5	Mineralogy, petrology, magmatism; spectrometry and remote sensing Lab 7: Multispectral Remote Sensing
Week 10	Mar. 24, 26	Surface morphology and examples; Volcanic tour of the solar system Lab 8: Volcanism Research Assignment 3 due
Saturday, April 5: Kilbourne Hole Field Trip		
IV. TECTONICS		
Week 11	Mar. 31, Apr. 1	Physics of deformation: stress, strain, faulting; modelling Lab 9: Image Interpretation II – Geologic Mapping (Mars & Venus)
Week 12	Apr. 7, 9	Surface morphology and examples; Tectonic tour of the solar system Lab 10: Tectonics Research Assignment 4 due
V. OTHER TOPICS		
Weeks 14, 15	Apr. 22, 23, 28, 30	Surface Processes; Atmospheres; Potential Fields; Rings; Interiors Lab 11: Outer Planets, Rings, and Moons
VI. EXPLORATION		
Week 16	May 5, 7	Technology for robotic exploration of the solar system; Missions and mission design for planetary exploration Lab 12: Image Interpretation III – MSL

Final Examination/Final Project Presentations Wed., May 14, 1-3:45 pm

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