American Public University System

The Ultimate Advantage is an Educated Mind

School of Science, Technology, Engineering & Math

Course Number: SPST651

Course Name: Planetary Geology

Credit Hours: 3

Length of Course: 8 weeks

Prerequisite: SPST650

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Instructor Information

Instructor information is available in the classroom

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Course Description

This course examines the geologic and geochemical processes at work in the solar system. This new field of study is based on data collected only during the last few decades of spacecraft exploration and laboratory research on extraterrestrial materials. This recently collected data has given us a new understanding of planets and how they are shaped by geologic processes. In this course, geologic processes on extraterrestrial bodies are compared to those that occur on Earth. Space missions, scientific tools and techniques that allow us to study those processes are covered in depth.

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Course Scope

This course focuses on geologic processes on the planets, moons, and smaller bodies (asteroids, comets) of the Solar System. The class begins with a Grand Tour of the Solar System and an overview of its geologic bodies. Instead of the traditional approach of stepping outward planet by planet, the temporal history of Solar System exploration in the spacecraft era and the critical role that has been played by geoscience is employed. The history and role of orbiting or flyby spacecraft, landers and rovers, and astronauts (Moon exploration) in collecting knowledge of planetary geology is examined. This course takes an in-depth look at the different tools used by geologists to collect and analyze data from beyond the Earth. To this purpose, this course brings together various subdisciplines within the geological sciences, including mineralogy, petrology, geochemistry, volcanology, sedimentology, geomorphology, tectonics, geophysics, and remote sensing to explore the geologic bodies of Solar System.

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Course Objectives

Upon successful completion of this course students will be able to:

CO-1 Recall the planets, moons, and small bodies of the Solar System and the spacecraft missions that investigated them

CO-2 Explain how planets are shaped by past and present geologic processes.

CO-3 Discuss the evidence for different geologic processes that may have occurred on different Solar System bodies in the past.

CO-4 Compare and contrast the geologic processes operating on planets and other solar system bodies.

CO-5 Explain the scientific basis of the tools and techniques for studying the geology of solar system bodies

CO-6 Distinguish what is known and unknown about the surfaces and interiors of planets, moons, and other Solar System bodies

CO-7 Explain how and why other planetary bodies differ from Earth.

CO-8 Summarize the latest discoveries obtained from ground-based and space observations and from spacecraft data about the solar system.

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Course Delivery Method

This course delivered via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. Online assignments are due by Sunday evening of the week as noted and include Forum questions (accomplished in groups through a threaded forum), examination, and individual assignments submitted for review by the Faculty Member). Assigned faculty will support the students throughout this eight-week course.

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Course Resources

McSween, Jr, H., Moersch, J., Burr, D., Dunne, W., Emery, J., Kah, L., & McCanta, M. (2019). *Planetary Geoscience*. Cambridge: Cambridge University Press. doi:10.1017/9781316535769

Various resources from the APUS Library & the Open Web are also used.

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Evaluation Procedures and Grading

Reading Assignments: Weekly Take-Home Quizzes, Midterm and Final Exams are based on the weekly reading assignments in *Planetary Geoscience*.

Introduction Forum Assignment: In week 1, you are required to post in the Introductions Forum, and the post must be at least 250 words to meet the APUS-wide requirement. Details about this posting are in the description at the top of that forum.

Discussion Assignments: To complete these forums, post your own response to the prompt and respond to at least two of your classmates. The main post should represent thorough research and understanding of the topics. Your responses to other student's posts must be substantive (not merely saying "Good post"). The forum assignments combined are worth 12% of your course grade. Main posts are due on Wednesday at midnight Eastern time. Responses are due by Sunday at midnight Eastern time.

Laboratory Assignments: There will be 4 laboratory exercises. Each lab exercise will have an associated multiple-choice quiz.

Exams: There will be 8 weekly "take-home" style quizzes, a Midterm, and a Final Exam. You may use the textbook on the exams, but you may not receive help from another person during the exam or any other resources except your own notes.

The weekly “take-home” quizzes are multiple short essays questions, which are the end-of-chapter review questions in *Planetary Geoscience*. Each weekly quiz is worth 5% of your course grade. You are expected to provide answers to each end-of-chapter review questions. Each answer must be a minimum of one well-written paragraph, and in some cases more than one paragraph. The number of paragraphs should be appropriate to provide detailed and comprehensive explanations and responses.

This is also a writing exercise and grammar and spelling count! It is not necessary, but if you use information from any outside sources it must be properly cited. There is no time limit, and the exams do not have to be completed in one sitting. These exams are due on Sunday nights of the weeks in which they are assigned.

The Midterm Exam will cover weeks 1-4. The Final Exam will be comprehensive and cover weeks 1-8. The exams are on-line, open-book, and timed. Each of these exams will include a few questions that cover the readings in the Weekly Lesson Content. They may include multiple choice, fill in the blank, and short essay type questions. You are not to collaborate on the exams – all work must be your own.

Assignments	Points	% of Course Grade
Discussion Forum Assignments (6)	**2 pts each**	**12%**
Laboratory Quizzes (4)	**3 pts each**	**12%**
Weekly Quizzes (8)	**5 pts each**	**40%**
Midterm Exam	**16 pts**	**16%**
Final Exam	**20 pts**	**20%**
Total Course Points		**100%**

Please see the Student Handbook to reference the University’s grading scale.

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8 – Week Course Outline

Please see the table below for the weekly readings and assignments.

Week	Topic	Readings	Assignments

1	**Grand Tour of the Solar System; and Terrestrial and Planetary Remote Sensing**	**Required Reading:** **MacSween*, et.al.* –** *Exploring the Solar System, Chapter 1* *Toolkits for the Planetary Geoscientist: Spectroscopy and Imaging, Chapter 2* **Laboratory Manual-** Chapter 2: Earth's Interior **Weekly Classroom Lesson 1**	Introductions Forum Post Weekly "Take-Home" Exam 1 (12 Short Essay Questions)
2	**Terrestrial and Planetary Remote Sensing cont.; and Cosmochemistry**	**Required Reading:** **MacSween*, et.al.* –** *More Toolkits for the Planetary Geoscientist: Chronology, Mapping, Geophysics, and Laboratory Analysis, Chapter 3*	Week 2 Forum Weekly "Take-Home" Exam 2 (14 Short Essay Questions) Lab Quiz - Chapter 2: Earth's
		Solar System Raw Materials, Chapter 4 **Weekly Classroom Lesson 2**	Interior
3	**Planetary Origins and Compositions**	**Required Reading:** **MacSween*, et.al.* –** *Assembling Planetesimals and Planets, Chapter 5* *Planetary Heating and Differentiation, Chapter 6* **Laboratory Manual-** Chapter 1: Introduction to Physical Geology **Weekly Classroom Lesson 2**	Week 3 Forum Weekly "Take-Home" Exam 3 (10 Short Essay Questions)

4	**Planetary Interiors**	**Required Reading:** **MacSween*, et.al. –*** *Unseen Planetary Interiors, Chapter 7* *Planetary Geodynamics, Chapter 8* **Weekly Classroom Lesson 4**	Weekly "TakeHome" Exam 4 (13 Short Essay Questions) Midterm Exam - Timed Lab Quiz - Chapter 1: Introduction to Physical Geology
5	**Planetary Tectonics and Volcanism**	**Required Reading:** **MacSween*, et.al. –*** *Planetary Structures and Tectonics, Chapter 9* *Planetary Igneous Activity, Chapter 10* **Laboratory Manual** Chapter 3: Topographic Maps **Weekly Classroom Lesson 5**	Week 5 forum Weekly "Take-Home" Exam 5 (11 Short Essay Questions)

6	**Cratering and Planetary Surface Processes**	**Required Reading:** **MacSween*, et.al.* –** *Impact Cratering as a Geologic Process, Chapter 11* *Planetary Atmospheres, Oceans, and Ices, Chapter 12* **Weekly Classroom Lesson 6**	Week 6 forum Weekly "Take-Home" Exam 6 (13 Short Essay Questions) Lab Quiz- Chapter 3: Topographic Maps
7	**Planetary Surface Processes cont.**	**Required Reading:** **MacSween*, et.al.* –** *Planetary Aeolian Processes and Landforms, Chapter 13* *Planetary Fluvial and Lacustrine Landforms: Products of Liquid Flow, Chapter 14* *Physical and Chemical Changes: Weathering, Sedimentology, Metamorphism, and Mass Wasting, Chapter 15* **Laboratory Manual** Chapter:12: Crustal Deformation **Weekly Classroom Lesson 7**	Weekly "Take-Home" Exam 7 (18 Short Essay Questions)
8	**Astrobiology; and Putting it all together with a Case Study (Mars); and finally, Geology of Other Solar Systems?**	**Required Reading:** **MacSween*, et.al.* –** *Astrobiology: A Planetary Perspective on Life, Chapter 16* *Integrated Planetary Geoscience: A Case Study (Mars), Chapter 17* *Epilogue: Geologic Processes in Other Solar Systems?* **Weekly Classroom Lesson 8**	Weekly "TakeHome" Exam 8 (10 Short Essay Questions) Lab Quiz- Chapter:12: Crustal Deformation Week 8 Forum Comprehensive Final Exam (timed)

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Policies

Writing Expectations

All activities completed in this course are to follow the stated instructions (inside the classroom). Always check the grading rubrics to see what your instructor will be on the lookout for when grading your work. Also, be sure you have read the APUS Plagiarism Policy (the entire Academic Dishonesty section) before submitting work in this or in any other course. See the above Course Outline or the Policies section on this Syllabus for links.

Citation and Reference Style

Attention: You will follow the citation style that is common to your discipline. Instructions regarding citation styles are included in the classroom.

Late Assignments

Students are expected to submit assignments by the due dates listed in the classroom. Late assignments, including but not limited to Assignments, Discussions, posts and responses, quizzes, and exams, may or may not be accepted after the course end date. Submitting an assignment after the due date may result in a penalty of up to 10% of the grade per day late, not to exceed a maximum 50% of the grade. The amount of the penalty is at the faculty member's discretion. Faculty recognize that students have limited time and maybe more flexible if potential delays are communicated ahead of time.*

*Doctoral and Programs with specialty accreditation may have different late policies.

**Students with DSA accommodations may have different late policies applied. For more information regarding our DSA services, please contact DSA@apus.edu.

Also, completing all Assignments (under the Assignments tab) is paramount to your success in this course.

Netiquette

Online universities promote the advancement of knowledge through positive and constructive debate, both inside and outside the classroom. Forums on the Internet, however, can occasionally degenerate into needless insults and flaming. Such activity and the loss of good manners are not acceptable in a university setting. Basic academic rules of good behavior and proper Netiquette must persist. Remember that you are in a place for the rewards and excitement of learning, which does not include descent to personal attacks orstudent attempts to stifle the learning of others.

- Humor Note: Despite the best of intentions, jokes and especially satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add emoticons to help alert your readers: ;-), :), .

Disclaimer Statement

Course content may vary from the outline to meet the needs of this particular group.

Student Communication

To reach the instructor, please communicate through the MyClassroom email function accessible from the Classlist of the Course Tools menu, where the instructor and students email addresses are listed, or via the Office 365 tool on the Course homepage.

- In emails to instructors, it's important to note the specific course in which you are enrolled. The name of the course is at the top center of all pages.
- Students and instructors communicate in Discussion posts and other learning activities.
- All interactions should follow APUS guidelines, as noted in the Student Handbook, and maintain a professional, courteous tone.
- Students should review writing for spelling and grammar.
- Tips on Using the Office 365 Email Tool

Instructor Communication

The instructor will post announcements on communications preferences involving email and Instant Messaging and any changes in the class schedule or activities.

- Instructors will periodically post information on the expectations of students and will provide feedback on assignments, Discussion posts, quizzes, and exams.
- Instructors will generally acknowledge student communications within 24 hours and respond within 48hours, except in unusual circumstances (e.g., illness).
- The APUS standard for grading of all assessments (assignments, Discussions, quizzes, exams) is five days or fewer from the due date.
- Final course grades are submitted by faculty no later than seven days after the end date of the course or the end of the extension period.

University Policies

Consult the Student Handbook for processes and policies at APUS. Notable policies:

- Drop/Withdrawal Policy
- Extension Requests
- Academic Probation
- Appeals
- Academic Dishonesty / Plagiarism
- Disability Accommodations
- Student Deadlines
- Video Conference Policy

Mission

The mission of American Public University System is to provide high-quality higher education with emphasis on educating the nation's military and public service communities by offering respected, relevant, accessible, affordable, and student-focused online programs that prepare students for service and leadership in a diverse, global society.

Minimum Technology Requirements

- Please consult the catalog for the minimum hardware and software required for undergraduate and graduate courses.
- Although students are encouraged to use the Pulse mobile app with any course, please note that not all course work can be completed via a mobile device.