SPST632

Course Summary

Course : SPST632 **Title :** Lunar Geology
Length of Course : 8 Edward Albin
Prerequisites : N/A **Credit Hours :** 3

Description

Course Description: This course examines the Moon in a systematic way, including the current theory of the origin of the Moon and processes such as impact cratering, volcanism, and tectonics. A detailed review of past manned/unmanned lunar geological exploration findings will also be addressed, along with critical aspects of lunar geology relevant to the return of humankind to the Moon.

Course Scope:

This course takes a close look at the geology of the Moon and exploration efforts by unmanned and manned missions. The Moon is our nearest neighbor in space and although we haven't sent astronauts there in almost 40 years, humankind is planning to return – and this time to stay. Lunar geology is therefore a relevant and very important issue in the field of space studies. Over the duration of the term, we'll take a close look at the various geologic processes that have modified the surface of the Moon. After considering the geologic history of our natural satellite, the agenda includes a look at how and why we'll return to the Moon, with emphasis on resource exploitation and colonization.

Objectives

Upon completion of this course, the student will be able to:

- Discuss some basic physical properties of the Moon (size, orbit, phases, eclipses etc.).
- Describe the events that led to the origin of the Moon.
- Express NASA's strategy for lunar exploration.
- Explain the effects of impact cratering on the lunar surface.
- Describe evidence of volcanism and tectonism on the Moon.
- Review the techniques used for creating geological maps of the Moon.
- Discuss the details and geologic contributions of the Apollo missions.
- Develop a geologic history for the Moon.
- Tell why the exploration of the Moon is important to humanity as a space-faring civilization.

Outline

Week 1: Introduction to Lunar Geology

Learning Objectives

- Why Study the Moon
- The Moon and Human History
- Pioneers in Lunar Geology
- *Video – "Lunar Reconnaissance Orbiter"*

Readings/Assignments

Spudis: Chapter 1

Wilhelms (a): Chapter 1

Wilhelms (b): Chapter1

Week 1 Agenda found within "Announcement" Section

Week 2: Exploration of the Moon

Learning Objectives

- NASA's Exploration Strategy
- Geology Primer - The Stratigraphic Approach
- Training the Explorers (Astronauts)
- *Video – "Ranger, Lunar Orbiter, Surveyor"*

Readings/Assignments

Spudis: Chapter 3

Wilhelms (a): Chapter 2

Wilhelms (b): Chapter 4

Week 2 Agenda found within "Announcement" Section

Week 3: Impact Craters

Learning Objectives

- Cratering Mechanics & Morphology
- Simple & Complex Craters
- Multi-ring Impact Basins
- Apollo 11 Mission – Tranquility Base
- *Video – Moon Machines – "Spacesuits"*

Readings/Assignments

Spudis: Chapter 2

Wilhelms (a): Chapter 3

Wilhelms (b): Chapter 11

Week 3 Agenda found within “Announcement” Section

Week 4: The Terrae

Learning Objectives

- Origin of the Moon – Giant Impact Model
- Early Lunar Crust & Magma Ocean
- Basin Materials – Orientale Basin Example
- Apollo 12 Mission – Oceanus Procellarum
- *Video – From Earth to Moon – “Apollo 12”*

Readings/Assignments

Spudis: Chapters 6

Wilhelms (a): Chapter 4

Wilhelms (b): Chapter 12

Week 4 Agenda found within “Announcement” Section

Week 5: The Maria

Learning Objectives

- Origin and Emplacement of the Maria
- Sinuous Rilles, Lava Flows, & Volcanoes
- Tectonics: Straight Rilles & Wrinkle Ridges
- Apollo 14 Mission – Fra Mauro
- *Video – Moon Machines – “Lunar Module”*

Readings/Assignments

Spudis: Chapter 5

Wilhelms (a): Chapters 5 & 6

Wilhelms (b): Chapter 14

Week 5 Agenda found within “Announcement” Section

Week 6: Geologic History of the Moon

Learning Objectives

- Superposition & Relative Ages
- Crater Statistics & Relative Ages
- Timescale: A Geologic History of the Moon
- Apollo 15 Mission – Hadley Rille
- *Video – Moon Machines – “Lunar Rover”*

Readings/Assignments

Spudis: Chapter 4

Wilhelms (a): Chapter 7

Wilhelms (b): Chapter 15

Week 6 Agenda found within “Announcement” Section

Week 7: Origin of the Moon

Learning Objectives

- Early Models of Lunar Origin
- Giant Impact Theory for Lunar Origin
- Apollo 16 Mission – Descartes
- *Video – “In the Shadowof the Moon” (Part 1)*

Readings/Assignments

Spudis: Chapter 7

Wilhelms (a): None

Wilhelms (b): Chapter 16

Week 7 Agenda found within “Announcement” Section

Week 8: Outposts on the Moon

Learning Objectives

- Why? – Reasons to Return to the Moon
- How? – Orion Capsule & Heavy-Lift Vehicles
- When? – Moonbases and Colonization
- Apollo 17 Mission – Taurus Littrow
- *Video – “In the Shadowof the Moon” (Part 2)*

Readings/Assignments

Spudis: Chapters 9 & 10

Wilhelms (a): None

Wilhelms (b): Chapter 17

Week 8 Agenda found within “Announcement” Section

Evaluation

Your final grade will consist of an average of the following items:

Forum Participation: Eight times throughout this course discussion items will be posted within the Forum area of the classroom. Your responses must be between 100-300 words, be in YOUR OWN WORDS, well written and grammatically correct. Sources used must be cited at the end of your posting (not included in the word count). Your responses will clearly show whether you have completed assigned classroom readings. Opinions are always welcome… However, postings providing only opinions will be graded accordingly! Be sure to read the directions associated with each posting.

Weekly Quizzes: Quizzes are designed to review assigned reading or video assignments. Quizzes are to be taken online, and you will get two attempts at each quiz to help you master the material. The highest score of the two attempts is the one that is kept. Quizzes must be taken during specific dates. Although open book, students are not to give or receive help on the weekly quizzes.

Homework Assignments: There are eight homework assignments for this course, each covering various aspects of assigned course readings. Information on homework assignments will be posted within the Assignments area of the classroom, on the days listed in the Announcements (home) page.

Final Exam: The final exam is comprehensive in scope and is based on readings from your textbook over the eight week session. The best way to prepare for the final exam is to review the weekly quizzes.

Grading:

Name	Grade %

Materials

Book Title: There are no required books for this course.

Author: N/A

Publication Info: N/A

ISBN: N/A

Course Textbooks:

Spudis, “Once and Future Moon,” MBS Reprint # 949063 (Good prices on Amazon.com too)

Wilhelms (a), “Geologic History of the Moon” (Online, No Purchase Required)

Wilhelms (b), “To a Rocky Moon: A Geologist's History of Lunar Exploration” (Online, No Purchase Required)

Additional Reading:

Announcements, forums, online lessons, and selected journal articles

Websites:

In addition to the required course texts, the following public domain websites are useful. Please abide by the university’s academic honesty policy when using Internet sources as well. Note Web site addresses are subject to change.

Site Name	Website URL/Address
Lunar Reconnaissance Orbiter	http://www.nasa.gov/mission_pages/LRO/main/index.html
Lunar Map Catalog	http://www.lpi.usra.edu/resources/mapcatalog/

Apollo Lunar Surface Journal	http://www.history.nasa.gov/alsj/
Lunar Photo of the Day	http://lpod.wikispaces.com/December+11%2C+2011

Other Resources:

As provided

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- Tutor.com offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and

submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

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

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

Identity Verification & Live Proctoring

- Faculty may require students to provide proof of identity when submitting assignments or completing assessments in this course. Verification may be in the form of a photograph and/or video of the student’s face together with a valid photo ID, depending on the assignment format.
- Faculty may require live proctoring when completing assessments in this course. Proctoring may include identity verification and continuous monitoring of the student by webcam and microphone during testing.

University Policies

Student Handbook

- Drop/Withdrawal policy
- Extension Requests
- Academic Probation
- Appeals
- Disability Accommodations

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.