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American Public University System

The Ultimate Advantage is an Educated Mind

School of Science, Technology, Engineering & Math

Course Number: SPST 650

Course Name: Foundations of Earth and Planetary Sciences

Credit Hours: 3

Length of Course: 8 weeks

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Instructor Information

Instructor: [Instructor Name]

Email: [Instructor Email]

Office Hours: See Syllabus link MyClassroom

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Course Description

SPST 650: Foundations of Earth and Planetary Sciences is the first in a series of courses toward a graduate degree with a concentration in Earth and Planetary Sciences. This is a survey course overviewing key concepts, dominant paradigms, and research frontiers in Earth and planetary sciences. This course will prepare you for the concentration by providing a foundation for topics including planetary geologic processes, geology of the moon and Mars, small bodies of the solar system, planetary mapping, and planetary atmospheres. SPST 650 serves as a required introductory course for this concentration. This course includes videos, lectures, readings, discussions, and a 6-part project to explore these topics.

Issues covered in SPST 650: Foundations of Earth and Planetary Sciences, include aspects of both Earth Sciences and Space Studies:

- **Earth Sciences:** Physical geography, remote sensing and GIS; geology, rocks and mineral exploration, oceans, atmospheres, natural cycles, earth habitability, drones and UAVs, and
- **Space Studies:** Planets, solar system dynamics, impact craters, asteroids, meteorites, astronomy, habitable worlds, Earth observation technology, satellites, and space exploration.

Pre-requisites for this course are SPST 501: Introduction to Space Studies and SPST 500: Research Methods.

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Course Scope

This course presents foundational concepts, principles, and problems in Earth and Planetary Sciences. In this course, students will examine small bodies of the solar system, geologic processes, planetary mapping, atmospheres and other aspects of the Earth, Moon, Mars and beyond. Emphasis will be on applying introductory principles of Earth and Planetary Sciences through directed readings, discussions, and final project development. Students will be expected to use the scientific method and cross-disciplinary and critical thinking skills as well as creativity and innovation.

The course empowers students to engage in critical thinking, communication, information literacy and academic skills that support creative decision-making and life-long learning.

This is a required course for those seeking a graduate degree Space Studies and Earth Sciences, with a concentration in Earth and Planetary Sciences.

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Course Objectives

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

- CO-1** Explain theories, features, and processes (physical, chemical, and geologic) associated with the Earth, Moon, planets, and other space bodies.
- CO-2** Analyze the origin, composition, and/or formation of interiors, landforms, oceans, and atmospheres of the Earth, planets, and other space bodies.
- CO-3** Describe ways terrestrial (rocky) moons and planets are mapped utilizing current technologies including remote sensing and geographic information systems (GIS).
- CO-4** Demonstrate scholarly research and communication skills (i.e., critically analyze, evaluate, and effectively communicate findings) through written, oral, and visual presentation.

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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 Discussion forum questions (accomplished in groups through a threaded Discussion), 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 (Required)

The following **free open educational resources** are required to successfully complete this course. See Course Outline for specific chapters assigned from these texts each week. **NOTE:** *Select “newer version” on these text web sites when available. Expand “Contents” of each book to see book chapter headings.*

For each week, find the required and supplementary readings under Course Content → Learning Material → Readings and Resources.

1. Lissauer, J.J. & Pater, I. (2013). *Fundamental Planetary Science: Physics, Chemistry and Habitability*. [Available Online](#) and for download from ProQuest.
2. Johnson, C., Affolter, M.D., Inkenbrandt, P., Mosher, C. (2017). *An Introduction to Geology*. [Available Online](#) and for download from Salt Lake Community College.
3. Fraknoi, A., Morrison, D., & Wolff, S. C. (2016). *Astronomy*. [Available online](#) and for download from OpenStax CNX.
4. Taylor, S. R., & McLennan, S. (2008). *Planetary crusts: Their composition, origin and evolution*. Cambridge University Press. [Available Online](#) and for download from ProQuest.
5. Carr, M. H. (2007). *The surface of Mars* (Vol. 6). Cambridge University Press. [Available online](#) and for download from ProQuest.
6. Greeley, R. (2013). *Introduction to planetary geomorphology*. Cambridge University Press. [Available online](#) and for download from ProQuest.

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Evaluation Procedures and Grading

Reading Assignments: Reading assignments are specified in the Course Outline (next section of this Syllabus) and course Content each week. Make sure to use the weekly readings – as well as your own independent research – to accomplish the 6-part Assignment series.

Discussions. There is a Discussion due each week of the course. You are required to post your own response to the question prompt provided and to respond to at least two of your classmates in a substantive way. Your initial post is your substantive response (i.e., 250 words,

thoughtful, conversational) to the question prompt presented; it is due by 11:59 p.m. Eastern time on Wednesdays. Your two replies should be substantive (i.e., 100 words each) and saying MUCH more than “good post” or “I agree”. Each Discussion is worth 6% of your course grade. Main posts are due Wednesdays at midnight Eastern time; replies to classmates are due Sundays by midnight Eastern time.

Project Assignment Series. There is a 6-part Assignment series in this class.

- Assignment 1 (due Week 2) is worth 4%
- Assignment 2 (due Week 3) is worth 6%
- Assignment 3 (due Week 4) is worth 8%
- Assignment 4 (due week 5) is worth 10%
- Assignment 5 (due Week 6) is worth 12%
- Assignment 6 (due Week 7) is worth 12%

This is a “scaffolded” project, which means each assignment builds on the previous one(s). The Assignment series provides an opportunity for students to develop a deeper understanding of the topics covered in the class as well as the chance to develop writing and research skills.

Specific instructions can be found in the Assignment section of class. All content should be original and well-researched. Scholarly sources and APA format are required. APUS Trefry library is a great resource for finding appropriate works.

Late Work: Late work will be accepted up to 5 days late (maximum) past the due date before earning a zero score. Note: There is a 5% score deduction each day its late, unless you have prior instructor approval for an in-class extension.

Scoring Table (below) displays the point allocation for each assignment in class:

Assignments	% of Course Grade
Discussions (8) @ 6 pts each	48%
Assignment 1 (due Week 2)	4%
Assignment 2 (due Week 3)	6%
Assignment 3 (due Week 4)	8%
Assignment 4 (due Week 5)	10%
Assignment 5 (due Week 6)	12%
Assignment 6 (due Week 7)	12%
Total Course Grade	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 due:

<u>Week</u>	<u>Topic</u>	<u>Readings</u>	<u>Assignment</u>
1	Solar System and Planetary Formation Foundations of Earth and Planetary Sciences: An Introduction to Earth and Planetary Sciences and the EPS Concentration The Scientific Method Our Solar System and the Formation of Earth, Planets, and other Space Bodies Earth in Space: Solar System Formation The Nebular Hypothesis and the Protoplanetary Disk Planetary Gravity and Magnetic Fields Planetary Conditions that Created Earth as a Habitable World	Text Readings: For each week, find the required and supplementary readings under Course Content → Learning Material → Readings and Resources 1) Fundamental Planetary Science. Chapters 1, 15, and 16 (16.1-16.11 only) 2) An Introduction to Geology. Chapter 8 3) Astronomy. Chapters 1, 3, 4, 7, and 8 (8.1 and 8.2 only)	Discussion 1 due
2	Geologic Time and Earth's Formative History Our Unique Earth Geologic Time Eons, Eras, and the Geological Column The Formation of Earth: Earth's Interior	Text Readings: 1) An Introduction to Geology. Chapters 1-4, 6, and 7 2) Introduction to Planetary Geomorphology. Ch. 1	Discussion 2 due Assignment 1 due

	<p>Earth's Rock Cycle: Minerals, Rocks, Depositional Environments, and Stratigraphy</p> <p>Plate Tectonics, Earthquakes and Volcanoes</p> <p>Fossils and Earth History</p>		
3	<p>Structural Geology and Geophysical Methods</p> <p>Structural Geology</p> <p>Planetary Surfaces and Interiors</p> <p>Seismology, Seismic Waves, and Earthquakes</p> <p>Volcanoes</p> <p>Sedimentary, Igneous and Metamorphic Processes</p> <p>Transport and Deposition of Sediments</p> <p>Folds and Faults</p> <p>Geophysical Methods</p>	<p>Text Readings:</p> <p>1) Fundamental Planetary Science. Chapter 6</p> <p>2) An Introduction to Geology. Chapter 1, 2, 4, 6, 9 and 16</p> <p>3) Introduction to Planetary Geomorphology. Ch. 2</p>	<p>Discussion 3 due</p> <p>Assignment 2 due</p>
4	<p>Geomorphology and Comparative Planetology</p> <p>Planetary Geomorphology and Geological Processes</p> <p>Weathering and Erosion</p> <p>Earth Spheres: Lithosphere (geosphere), Biosphere, Hydrosphere, Cryosphere, and Atmosphere</p> <p>Biogeochemical Cycles on Earth</p> <p>Ice and Glaciation</p>	<p>Text Readings:</p> <p>1) Fundamental Planetary Science. Chapter 6</p> <p>2) An Introduction to Geology. Chapter 5</p> <p>3) Introduction to Planetary Geomorphology. Ch 3-11</p>	<p>Discussion 4 due</p> <p>Assignment 3 due</p>

	Comparative Planetology: Earth-like Features of Venus, Mars and other Space Bodies		
5	Geology of the Moon and Mars Comparative Planetology: The Earth, Moon and Mars The Geological History of Mars Lunar Water, Minerals and Solar Energy Impact Cratering, Volcanism, and Tectonics of the Moon and Mars Exploration of the Moon and Mars	Text Readings: 1) Astronomy. Chapters 9-11 2) The Surface of Mars. Chapter 1-8	Discussion 5 due Assignment 4 due
6	Small Bodies of the Solar System An Introduction to Small Bodies of the Solar System Asteroids, Meteorites, Comets, and Dwarf Planets Planetary Satellites and Rings Complexity and Chaos Theories Large-scale Resonances and Gravitational Interactions	Text Readings: 1) Astronomy. Chapters 12-14 2) Planetary Crusts. Chapter 1-7 and 13	Discussion 6 due Assignment 5 due
7	Earth and Planetary Atmospheres Planetary Atmospheres Earth's Early Atmosphere Climate, Albedo, and Ozone	Text Readings: 1) Fundamental Planetary Science. Chapters 5 and 7 2) Astronomy.	Discussion 7 due Assignment 6 due

	<p>Oceans, Tectonics, and Atmosphere Interactions</p> <p>Orbital Impacts to Climate</p> <p>Solar Radiation and Earth Atmosphere</p> <p>The Sun, Solar Wind and Magnetic Fields</p>	<p>Chapters 8, 10, 15, and 16</p> <p>3) The Surface of Mars. Chapter 9, 10, and 12</p>	
8	<p>Planetary Mapping</p> <p>Geologic Maps</p> <p>Planetary Cartography and Topographic Maps</p> <p>Applications of Geographic Information Systems (GIS) and Remote Sensing</p> <p>Space-based Earth Observation (EO) technology</p> <p>Drones for Planetary Exploration</p> <p>Coastal Landforms and Stream Channels</p> <p>Course Conclusion: A Review of Earth and Planetary Sciences</p>	<p>Text Readings:</p> <p>1) An Introduction to Geology. Chapters 10-14</p> <p>2) The Surface of Mars. Chapter 11</p>	<p>Discussion 8 due</p>

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Policies

Please see the [Student Handbook](#) to reference all University policies. Quick links to frequently asked question about policies are listed below.

[Drop/Withdrawal Policy](#)

[Plagiarism Policy](#)

[Extension Process and Policy](#)

[Disability Accommodations](#)

Writing Expectations

All written submissions should be submitted in a font and page set-up that is readable and neat. It is recommended that students try to adhere to a consistent format, such as that described below.

- Typewritten in double-spaced format with a readable style and font and submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- 12-point font in a style such as Arial, Helvetica or Times New Roman.

Citation and Reference Style

Assignment format must follow a widely accepted citation style, specifically APA. Please refer to the APUS Online Library for further examples or contact the instructor with questions.

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. As adults, students, and working professionals, I understand you must manage competing demands on your time. Should you need additional time to complete an assignment, please contact me **before the due date** so we can discuss the situation and determine an acceptable resolution. Routine submission of late assignments is unacceptable and may result in points deducted from your final course grade.

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 or student attempts to stifle the Forum of others.

- **Technology Limitations:** While you should feel free to explore the full-range of creative composition in your formal papers, keep e-mail layouts simple. The Sakai classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.
- **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.

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The Online Library is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Online Library provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to librarian@apus.edu.

- **Trefry Library and Inter Library Loan:** The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.
- **Electronic Books:** You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- **Electronic Journals:** The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.
- **Tutor.com:** AMU and APU Civilian & Coast Guard students are eligible for 10 free hours of tutoring provided by APUS. [Tutor.com](http://tutor.com) connects you with a professional tutor online 24/7 to provide help with assignments, studying, test prep, resume writing, and more. Tutor.com is tutoring the way it was meant to be. You get expert tutoring whenever you need help, and you work one-to-one with your tutor in your online classroom on your specific problem until it is done.

Library Guide (<http://apus.campusguides.com/SCIN134>)

The AMU/APU Library Guides provide access to collections of trusted sites on the Open Web and licensed resources on the Deep Web. This course guide provides links to a number of sources relevant to this course, including journals, books, and web sites. Also, you can directly contact the librarian assigned to this course for assistance in locating information.

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