SYLLABUS FOR PTYS/GEOS/HWRS 411
Geology and Geophysics of the Solar System (3 Credits)

The University of Arizona – Spring 2024

Kuiper Space Sciences Building, Room 330, Tuesdays and Thursdays from 11:00 to 12:15 p.m.

Description of Course

This class explores a variety of geologic processes and how they have shaped planetary landscapes, environments, and exploration priorities. Students will develop a quantitative understanding of the major geophysical and geochemical processes associated with evolution of planetary surfaces within our Solar System. Students will be also develop their scientific reasoning and writing skills by conducting independent literature reviews and synthesizing their findings into an original research report to gain to experience with how to read and evaluate scientific literature.

Course Prerequisites or Co-requisites

There are no explicit course prerequisites for this course and anyone may enroll; however, the course is intended for juniors and seniors and as such contains advanced material. Many of the lectures and homework assignments will contain material of a mathematical nature and at least a basic knowledge of calculus will be necessary to understand it. Students are also be expected to conduct weekly readings and develop written assignments. Please speak to the instructor if you have any questions or concerns.

Instructor and Contact Information

Instructor: Christopher Hamilton, Phone: +1-301-305-3818, e-mail address: chamilton@arizona.edu

Office Hours: I will be available in my office (Kuiper Space Sciences Building, Room 430) on Tuesday afternoons from 2:00 to 3:00 p.m. If you would like to schedule a meeting outside these hours, please contact me via email to arrange a time.

Course Format and Teaching Methods

The format of the course includes in-class lectures and group assignments; weekly reading assignments drawn from both the course textbook and external material; a mid-term; final research report, and final in-class presentation.

Course Objectives

Each week, students will read one chapter from the course textbook and read one additional peer-reviewed scientific paper. This information will then be synthesized into a term project, consisting of a written report and final presentation. Students are expected to attend lectures and complete homework assignments on time. Together these activities are intended to provide students with a fundamental understanding of geological and geophysical processes and develop skills related to critical thinking.

Expected Learning Outcomes

Students will learn the geophysical and geochemical basis of the fundamental geological processes that affect planetary surfaces throughout the Solar Systems. Students will also learn quantitative skills that will enable them to calculate how planetary parameters (e.g., gravitational acceleration, ambient temperature and pressure) affect fundamental geological processes and resulting landforms. Students will learn how to undertake scientific research by reading a minimum of ten peer-reviewed publications and synthesizing information into a report that includes original calculations of the effects of planetary environments on a process of their choosing. Students will also develop their communication skills by presenting a summary of their research to their peers. As a writing requirement course, students will also learn how to write scientifically, including how to use citations to develop referenced arguments.

Makeup Policy for Students Who Register Late

Students who register after the first-class meeting may make up missed assignments by Thursday, February 1, 2024, without penalty. After this time late assignments will not be accepted.

Course Communications

Course communication will be conducted via D2L to and from official university of Arizona e-mail addresses: https://d2l.arizona.edu/

Required Texts and Readings

The course textbook is available through the University of Arizona bookstore as well as through The University of Arizona Libraries in both hardcopy and electronic formats. PDF copies of the required reading for the first two-weeks of class are available through the course website on D2L, but after the first two-weeks students will be responsible for obtaining the reading material themselves. Other reading material can be accessed via the Internet or The University of Arizona Campus Libraries. The textbook is the following:

Melosh, H. J. (2011) “Planetary Surface Processes”, Cambridge University Press, New York, 500 pp.

Required or Special Materials

No special tools are required for this class; however, it is assumed that students have access to a basic computer, software (e.g., Microsoft Office, which is freely available through The University of Arizona), and internet connectivity to access electronic documents (e.g., the eBook textbook), prepare and submit assignments, and access other on-line content via D2L.

Required Extracurricular Activities

Depending on scheduling availability, the instructor will arrange for the class to spend one class in the planetarium for a special presentation.

Assignments and Examinations: Schedule/Due Dates

Weekly reading assignments include an assigned chapter from the course (textbook) and a peer-review scientific paper of the student’s choosing. Reading summaries of the scientific paper are due via D2L before class each Thursday beginning January 18. However, no reading reports are due during spring break or during the week of the mid-term exam. The final term paper will be due on April 16. Final presentations will be scheduled between April 22 and 29 and are each expected to be approximately ten-minutes-long. If students wish to obtain feedback on their term paper prior to grading, them may submit it to the instructor at least one-week before the

due date (i.e., April 9). The mid-term will be held in-class on April 4, and a mid-term review session will be held in-class on April 2. For full details see Table 1 in the "Scheduled Topics/Activities" section of the syllabus.

Final Examination/Project

This course will include a final written report and oral presentation in lieu of a final written examination.

Grading Scale and Policies

The course will employ The University of Arizona's standard grade system (i.e., A, B, C, D, and E). For additional information regarding the university's policy regarding grades and grading systems see: http://catalog.arizona.edu/policy/grades-and-grading-system

Homework Assignments: 10 × 3% = 30%
Term Project: 1 × 30% = 30%
Term Project Oral Presentation: 1 × 10% = 10%
In-Class Exam: 1 × 30% = 30%

All final grades will be rounded up to the nearest whole percentage point and percentage grades will be converted to letter grades as follows:

≥90%	⟶ A
≥75% (<90%)	⟶ B
≥60% (<75%)	⟶ C
≥50% (<60%)	⟶ D
<50%	⟶ E

Incomplete (I) or Withdrawal (W)

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal respectively.

Dispute of Grade Policy

If an error has been made with a grade, please address the issue with the instructor within one week of the grade being posted on D2L. At the end of the semester, final grades will be rounded up to the nearest percentage point. Grades will not otherwise be scaled or modified. Nonetheless, mistakes do happen, and it is reasonable and appropriate to challenge a grading mistake on an exam or assignment, or to request clarification about any grade. However, please do so in a timely fashion, and not wait the end of the semester.

Honors Credit

To take this course for Honors credit, students should contact the instructor to develop an Honors contract. Honors contract information is available at https://www.honors.arizona.edu/honors-contracts.

Scheduled Topics/Activities

Table 1 summaries the topics and baseline reading assignments for the semester. Additional reading assignments may be added (see notices on D2L). It is expected that students will read assigned textbook chapters by Tuesday of each week to be informed about the topics presented during each week's lectures.

Assignments (due on Thursdays) must be uploaded before class via D2L. Upload folders will be closed once class starts and late assignments will only be accepted with the instructor's consent. Unless prior arrangements, late assignments will receive a 20% penalty each day the assignment is late, including the first day they are due. Instructions for the weekly assignments and term paper are available on D2L and will be reviewed in class.

Week	Tuesday	Thursday
1	–	Jan. 11: Syllabus Review
2	Jan. 16: **Introduction to the Solar System** *Reading: "Planetary Surface Processes", Chapter 1: The Grand Tour*	Jan. 18: **Introduction to the Solar System** *Homework 1 Due: Paper Review*
3	Jan. 23: **The Fundamental Properties of Geologic Materials** *Reading: "Planetary Surface Processes", Chapter 3: Strength vs. Gravity*	Jan. 25: **The Fundamental Properties of Geologic Materials** *Homework 2 Due: Paper Review*
4	Jan. 30: **Tectonic Processes** *Reading: "Planetary Surface Processes", Chapter 4: Tectonics*	Feb. 1: **Tectonic Processes** *Homework 3 Due: Paper Review*
5	Feb. 6: **Aeolian Processes** *Reading: "Planetary Surface Processes", Chapter 9: Wind*	Feb. 8: **Aeolian Processes** *Homework 4 Due: Paper Review*
6	Feb. 13: **Volcanic Processes** *Reading: "Planetary Surface Processes", Chapter 5: Volcanism*	Feb. 15: **Volcanic Processes** *Homework 5 Due: Paper Review*
7	Feb. 20: **Volcanic Processes** (Guest Lecture) *Reading: None Assigned*	Feb. 22: **Volcanic Processes** (Guest Lecture) *Homework 6 Due: Paper Review*
8	Feb. 27: **Impact Cratering Processes** *Reading: "Planetary Surface Processes", Chapter 6: Impact Cratering*	Feb. 29: **Impact Cratering Processes** *Homework 7 Due: Paper Review*
9	Mar. 5. **SPRING RECESS** (No class)	Mar. 7. **SPRING RECESS** (No class)
10	Mar. 12: **Weathering and Erosion** *Reading: "Planetary Surface Processes", Chapter 17: Regoliths, Weathering, and Surface Texture*	Mar. 14: **Weathering and Erosion** *Homework 8 Due: Paper Review*
11	Mar. 19: **Planetary Ices** *Reading: "Planetary Surface Processes", Chapter 11: Ice*	Mar. 121: **Planetary Ices** *Homework 9 Due: Paper Review*
12	Mar. 26: **Deep-Time and Astrobiology** *Reading: Selections will be posted on D2L*	Mar. 28: **Deep-Time and Astrobiology** *Homework 10 Due: Paper Review*
13	Apr. 2: **Mid-Term Review**	Apr. 4: **Mid-Term Examination**
14	Apr. 9: Solar System: **Inner Solar System** *Reading: Selections will be posted on D2L*	Apr. 11: **Inner Solar System** *Homework 10 Due: Paper Review*
15	Apr. 16: **Outer Solar System** *Reading: Selections will be posted on D2L*	Apr. 18: **Outer Solar System** *Term Paper Due*
16	Apr. 23: **Term Project Presentations**	Apr. 25: **Term Project Presentations**
17	Apr. 30: **Term Project Presentations** *Graded Term Papers returned to students*	May 2: **READING DAY** (No Class)

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Some learning styles are best served by using personal electronics, such as laptops and iPads. However, these devices can be distracting to other learners. Students who prefer to use electronic devices for note-taking during lecture may do so, but please use your devices responsibly.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Notification of Objectionable Materials

This course does not contain material of a mature nature, such as explicit language, depictions of nudity, sexual situations, and/or violence. However, students are encouraged to speak with the instructor to voice concerns and to provide feedback should there be any issues.

Safety on Campus and in the Classroom

For a list of emergency procedures for all types of incidents, please visit the website of the Critical Incident Response Team (CIRT): https://cirt.arizona.edu/case-emergency/overview Also watch the video available at: https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy000000000003560

Confidentiality of Student Records

See: http://www.registrar.arizona.edu/ferpa

Additional Resources for Students

UA Academic policies and procedures are available at: http://catalog.arizona.edu/policies

Campus Health

http://www.health.arizona.edu/

Campus Health provides quality medical and mental health care services through virtual and in-person care.
Phone: 520-621-9202

Counseling and Psych Services (CAPS)

https://health.arizona.edu/counseling-psych-services

CAPS provides mental health care, including short-term counseling services.
Phone: 520-621-3334

The Dean of Students Office's Student Assistance Program

https://deanofstudents.arizona.edu/support/student-assistance

Student Assistance helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of interventions, referrals, and follow up services.
Email: DOS-deanofstudents@arizona.edu

Phone: 520-621-7057

Survivor Advocacy Program
https://survivoradvocacy.arizona.edu/

The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support.
Email: survivoradvocacy@arizona.edu
Phone: 520-621-5767

University-wide Policies link

Links to the following UA policies are provided here, http://catalog.arizona.edu/syllabus-policies:

- Absence and Class Participation Policies
- Threatening Behavior Policy
- Accessibility and Accommodations Policy
- Code of Academic Integrity
- Nondiscrimination and Anti-Harassment Policy
- Subject to Change Statement

Artificial Intelligence

In this course you are welcome and expected to use generative artificial intelligence (AI)/large language model (LLM) tools (e.g., ChatGPT, Dall-e, Bard, Perplexity). However, use of such tools must be disclosed in your report. Failure to report AI/LLM constitutes plagiarism. Also, be aware that many AI companies collect information; do not enter confidential information as part of a prompt. LLMs may generate false information and tools may reflect misconceptions and biases of the data they were trained on and the human-written prompts used to steer them. You are responsible for checking facts, finding reliable sources for, and making a careful, critical examination of any work that you submit. Nonetheless, use of AI/LLM tools aligns with the course learning goals in that it enables students to learn how to assess AI-generated content. Experimenting with AI/LLM tools also helps students to be aware of their value and limitations.

Health and Attendance

- Preserving your heath and the health of others on campus is a priority.
- If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel. Notify
- Notify your instructor(s) if you will be missing a course meeting or an assignment deadline.

Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 Federally-recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities.

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.