

SYLLABUS FOR PTYS/GEOS/HWRS 441:

Geology and Geophysics of the Solar System (3 Credits)

Kuiper Space Sciences Building, Room 312: Tuesdays and Thursdays 12:30–1:45 P.M.

Description of Course

This class will explore a variety of geologic processes and how they have shaped planetary landscapes and environments. To achieve this goal, students to develop a quantitative understanding of the major geophysical and geochemical processes associated with planetary bodies in our Solar System. Students will be also expected to develop their scientific reasoning and writing skills by conducting independent literature reviews and synthesizing their findings into an original research report.

Course Prerequisites or Co-requisites

There are no explicit course prerequisites 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 will 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: Dr. Christopher Hamilton
Office: Kuiper Space Sciences Building, Room 430
Office Telephone: 301-305-3818
E-mail: hamilton@lpl.arizona.edu

Office Hours: Dr. Hamilton will be available for questions and discussion after lectures on Tuesdays (2:00–3:00 P.M.). If you require additional assistance, please contact me to schedule an appointment.

Course Website: Lectures, homework assignments and general information on the course will be available online on a class website on D2L.

Teaching Assistant (TA) and Contact Information

TA: Patrick O'Brien
Office: Kuiper Space Sciences Building, Room 528
Office Telephone: 520-626-5541
Email: pob@lpl.arizona.edu

Office Hours: Thursdays 11:00 A.M. to Noon, or by appointment.

Course Format and Teaching Methods

The format of the course will include: in-class lectures and group assignments; weekly reading assignments drawn from both the course textbook and external material; a mid-term; and a final research report accompanied by an 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 how to: (1) read and critically assess peer-reviewed scientific literature; (2) prepare and present an effective, informative, and persuasive synthesis of scientific research; (3) discover the factors that control the formation and modification of planetary surfaces; (4) associate planetary landforms with fundamental geological processes; and (5) quantitatively examine how planetary conditions affect these processes using geophysical and geochemical models.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Absences may affect a student's final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class online activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, Room 100, or call 520-621-7057.

Assignments are due at the beginning of class on the due date (or before). If an assignment is due, you are responsible for turning it in, even if you are absent from class. Late work will generally not be accepted. However, if it is accepted, the instructor may apply a penalty of 25% to the assignment's score for each day that the assignment is late (i.e., if your score on the homework assignment would have been 85%, but it was handed in a day late, you will receive a score of 60%). For exams, if you have reason to believe you will be absent from class please let the instructor know in advance.

Makeup Policy for Students Who Register Late

Students registering after the first class will have the opportunity to make up missed assignments and quizzes until February 13, 2020.

Course Communications

Communications will be made in class and through D2L. Therefore, please verify that your D2L email address is valid.

Required Texts or Readings

The following textbook is required and is available through the University of Arizona bookstore:
Melosh, H. J. (2011) "Planetary Surface Processes", Cambridge University Press, New York, 500 pp.

Required or Special Materials

Students are expected to have access to Microsoft Word and Excel (or equivalent) to complete homework assignments.

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

The course includes 10 weekly reading assignments, due on Thursdays at the beginning of class. Due dates are as follows: (1) January 23, (2) January 30, (3) February 6, (4) February 13, (5) February 20, (6) February 27, (7) March 5, (8) March 26, (9) April 2, and (10) April 9, 2020.

The mid-term will be held on Thursday, April 16, 2020.

The final project will be due on Thursday, April 23, 2020

Final presentations will be made in-class on Tuesday, April 28; Thursday, April 30, Tuesday, May 5, 2020.

There will be a total of 5 in-class assignments and quizzes, which will be held periodically throughout the semester and will be evaluated as bonus points applied to the final grade, up to a maximum of 5%.

Assignments may not be revised after the formal due date; however, for the term project, preliminary drafts may be submitted at least one week prior to due date to obtain feedback.

Final Examination or Project

This course will include a final report, but not a final examination.

Grading Scale and Policies

Homework Assignments: $10 \times 3\% = 30\%$	Grades will be assigned as follows: A $\geq 90\%$
Term Project: $1 \times 30\% = 30\%$	B $\geq 75 < 90\%$
Term Project Oral Presentation: $1 \times 10\% = 10\%$	C $\geq 60 < 75$
In-Class Exam: $1 \times = 30\%$	D $\geq 50 < 60\%$
In-Class Assignments and Quizzes: $5 \times 1\% = 5\%$ Bonus	E $< 50\%$

Final grades will not be scaled; however, students may receive up to a 5% bonus toward the final grade based on their in-class attendance and participation.

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

Students have 2 weeks after the original due date on a homework assignment, exam, report, or presentation to dispute their grade.

Scheduled Topics/Activities

We will endeavor to follow this class schedule as closely as possible throughout the term:

- Week 1** **Course Overview and Introduction to the Solar System**
Reading: "Planetary Surface Processes", Chapter 1: The Grand Tour
Thursday, January 16: Syllabus review and introduction to the Term Project
Homework 1 Assigned (Due Thursday, January 23)
- Week 2** **The Fundamental Properties of Geologic Materials**
Reading: "Planetary Surface Processes", Chapter 3: Strength vs. Gravity
Tuesday, January 21: Stress, Strain, and Structure
Thursday, January 25: Flow, Flexure, and Failure
Homework 1 Due
Homework 2 Assigned (Due Thursday, January 30)
- Week 3** **Tectonic Processes**
Reading: "Planetary Surface Processes", Chapter 4: Tectonics
Tuesday, January 28: Faults and Folds
Thursday, January 30: Plate Tectonics vs. Other Forms of Tectonics
Homework 2 Due
Homework 3 Assigned (Due Thursday, February 6)
- Week 4** **Aeolian Processes**
Reading: "Planetary Surface Processes", Chapter 9: Wind
Tuesday, February 4: Aeolian Processes (Paper 6 Summary Due)
Thursday, February 6: Guest Lecturer
Homework 3 Due
Homework 4 Assigned (Due Thursday, February 13)
- Week 5** **Magmatic Processes**
Reading: "Planetary Surface Processes", Chapter 5: Volcanism
Tuesday, February 11: Melt, Mush, and Magma
Thursday, February 13: Magmatic Intrusions and Conduit Ascent Processes
Homework 4 Due
Homework 5 Assigned (Due Thursday, February 20)
- Week 6** **Volcanic Processes**
Reading: Selections will be posted on D2L
Tuesday, February 18: Explosive Eruptions
Thursday, February 20: Effusive Eruption
Homework 5 Due
Homework 6 Assigned (Due Thursday, February 27)

- Week 7** **Impact Cratering Processes**
Reading: "Planetary Surface Processes", Chapter 6: Impact Cratering
 Tuesday, February 25: Impact Cratering Mechanics (Paper 5 Summary Due)
 Thursday, February 27: The Impact Cratering Record
 Homework 6 Due
 Homework 7 Assigned (Due Thursday, March 5)
- Week 8** **Hydrological, Oceanic, and Atmospheric Processes**
Reading: "Planetary Surface Processes", Chapter 10: Water
 Tuesday, March 3: Hydrology
 Thursday, March 5: Oceans and Atmospheres
 Homework 7 Due
 Homework 8 Assigned (Due Thursday, March 26)
- Week 9** **Spring Recess (March 9 to 13)**
No Lectures or Reading Assignments on March 10 and 12
- Week 10** **Lunar and Planetary Science Conference (LPSC)**
Reading: Assignments Based on the LPSC Program
 Tuesday, March 17: Planetarium Show
 Thursday, March 19: Planetarium Show
- Week 11** **Weathering and Erosion**
Reading: "Planetary Surface Processes", Chapter 17: Regoliths, Weathering, and Surface Texture
 Tuesday, March 24: Space Weathering (Presented by TA Patrick O'Brien)
 Thursday, March 26: Erosion
 Homework 8 Due
 Homework 9 Assigned (Due Thursday, April 2)
- Week 12** **Planetary Ices**
Reading: "Planetary Surface Processes", Chapter 11: Ice
 Tuesday, March 31: Ice on Earth and Mars
 Thursday, April 2: Ice in the Outer Solar System
 Homework 9 Due
 Homework 10 Assigned (Due Thursday, April 9)
- Week 13** **Deep-Time and Astrobiology**
Reading: Selections will be posted on D2L
 Tuesday, April 7: Geological Eons
 Thursday, April 9: Astrobiology
 Homework 10 Due

Week 14	Mid-Term Review and Examination <i>Reading: Selections will be posted on D2L</i> Tuesday, April 14: Mid-Term Review Thursday, April 16: Mid-Term Examination
Week 15	The Solar System <i>Reading: Selections will be posted on D2L</i> Tuesday, April 21: Inner Solar System Thursday, April 23: Outer Solar System <i>Term Project Due</i>
Week 16	Term Project Presentations <i>Reading: Selections will be posted on D2L</i> Tuesday, April 28: Term Project Presentations I Thursday, April 30: Term Project Presentations II
Week 16	Term Project Presentations <i>Reading: Selections will be posted on D2L</i> Tuesday, May 5: Term Project Presentations III

Bibliography

In addition to the textbook, “Planetary Surface Processes”, additional reading material will be posted on D2L.

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 (e.g., texting, chatting, knitting, making phone calls, web surfing, etc.).

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.

Video and/or audio recording is not permitted in the classroom without consent of the instructor and invited speakers (if applicable).

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>.

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at: <http://new.library.arizona.edu/research/citing/plagiarism>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination. See: <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

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

Student Assistance and Advocacy information is available at: <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

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.