

Syllabus – Fall 2023 – PTYS/GEOS 554

Evolution of Planetary Surfaces

Instructor: Shane Byrne, Pronouns: He/Him
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Times and locations:

- Lectures on Tuesday and Thursday from 12.30pm to 1:45pm.
- Lectures will be held in room 330 of the Kuiper Space Sciences building.
- First lecture on Tuesday, August 22nd.

I'll be available for questions and discussion, both days after lectures. If you need help and cannot make these times, then email me to make another arrangement. I also have a general open-door policy so you can stop by anytime, but I'm not always available.

Course Website:

Lectures, homework assignments and general information on the course will be posted on D2L at:

<https://d2l.arizona.edu/d2l/home/1320606>

Scope of Course:

Planetary surfaces sit at the interface between the planet's atmosphere and interior and are also often exposed to exogenic processes like impacts and space-weathering. This makes them very complex to understand, but also rich historical archives that record changing conditions on that planet over the course of solar system history. In this class, we will explore how a variety of geologic processes, such as impact cratering, volcanism, tectonics, fluvial and atmospheric, shape planetary landscapes.

This course is intended for beginning graduate students with little previous exposure to geosciences. There are no course prerequisites, and anyone may enroll (undergraduates must be seniors to enroll for credit).

Course Objectives: During this course students will:

- Develop a quantitative understanding of the main processes that affect Planetary Surfaces
- Identify the resultant landforms that these surface processes create and how they can be interpreted.

Expected Learning Outcomes: Upon completion of this course students will be able to:

- Interpret planetary landforms in terms of what processes formed them.
- Understand what constraints these landforms place on the relevant timescales/environmental-conditions/material-properties.

Course credit:

There will be no final or mid-term exam in this course, students get credit for homeworks, a fieldtrip, and a final course project.

You are encouraged to discuss approaches to solving homework problems and your class projects with each other; however, all work submitted must be your own. Previously completed class projects may not be submitted for credit in this course.

- Homework will be assigned every two weeks in class. In general, this homework will be due two weeks from the date on which it is assigned. Some of these assignments may be based on analysis of spacecraft data. Late homework receives half credit and homework submitted a week or more after the due date receives no credit. If you are unable to complete a homework assignment on time (and have a good reason) you must come talk to me *before* the due date to avoid losing credit.
- There is a fieldtrip during this class which will be three days long and involve camping (two nights) and moderate hiking. We'll set the date of this trip during the first class of the semester, see the PTYS594 class website for details and examples of past trips <https://pirlwww.lpl.arizona.edu/wiki/Fieldtrip>.
- A final course project will be required of all students on some subject relevant to the content of the course. Students are encouraged to interact with me early in the semester to choose a topic for their project. A written report on this project will be due at the end of the semester. In lieu of a mid-term, there will be an LPSC-style abstract on your project due.

Doing something connected to your ongoing research is a good strategy, but if you do this then the work you do for your class project should be clearly-defined i.e. some self-contained aspect of your research rather than a direct continuation of what you were doing anyway. This project is a big fraction of the grade so you should expect to put some serious work into it

Homeworks/Labs	40%	
Fieldtrip participation	20%	
Project: Mid-term abstract	15%	40%
Project: Final Write-up	25%	

Grades are assigned according to the following scale. I don't rescale grades to ensure that any particular statistical distribution is met.	90-100%	A
	75-89%	B
	60-74%	C
	50-59%	D
	0-49%	E

Accessibility and Accommodations:

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

There is a fieldtrip associated with this class. If you foresee any barrier to participation, then please let me know early so we can discuss options.

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.

University Policies: Other University policies are listed at:

<https://academicaffairs.arizona.edu/syllabus-policies>

Topics and Timetable:

Expect adjustments throughout the course.

Week starting	Tuesday	Thursday	Notes
21-Aug	Course Introduction	Forming Planetary Crusts	
28-Aug	Forming Planetary Crusts	Forming Planetary Crusts	
4-Sep			CaSSIS Meeting
11-Sep	Gravity and Topography	Gravity and Topography	
18-Sep	Tectonic Processes	Tectonic Processes	
25-Sep	Impact cratering	Impact cratering	
2-Oct	Impact cratering	Surface processes on airless bodies	
9-Oct	Planetary Heating	Volcanic Processes	
16-Oct	Volcanic Processes	Volcanic Processes	
23-Oct	Glacial/Periglacial processes	Glacial/Periglacial processes	
30-Oct	Weathering & fate of sediments	Fluvial Processes	Fieldtrip ?
6-Nov	Fluvial Processes	Fluvial Processes	
13-Nov	Aeolian Processes	Aeolian Processes	
20-Nov	Solar system ices		Thanksgiving
27-Nov	Solar system ices	Geologic History of the Moon & Mercury	
4-Dec	Geologic History of Mars		Reading Day
13-Dec			Finals Week