

Syllabus – Fall 2019 – PTYS/GEOS 554  
**Evolution of Planetary Surfaces**

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**Times and locations:**

- Two lectures per week usually on Monday and Wednesday from 11 to 12:15am. We have another slot on Friday that will be frequently used.
- First lecture on Monday, August 26<sup>th</sup>.
- Lectures will be held in room 312 of the Kuiper Space Sciences building.

I'll be available for questions and discussion, both days after lectures. If you need help and cannot make these times, then please email me to make another arrangement. I 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 a class website at:

[http://www.lpl.arizona.edu/~shane/PTYS\\_554](http://www.lpl.arizona.edu/~shane/PTYS_554)

**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 and Expected Learning Outcomes**

Students who engage with this course will develop a quantitative understanding of the main processes that affect Planetary Surfaces. The course will present these geologic processes, the ways in which they can be understood through a physics-based approach and the resultant landforms that they create. The topics covered in this class include impact cratering, volcanism, tectonics, fluvial, aeolian and glacial/periglacial processes. Interpretation of landforms will be discussed in both remote sensing data and in the field at terrestrial analog sites.

Upon successful completion of this course students will be able to interpret planetary landforms in terms of what processes formed them and understand what constraints these landforms place on the relevant timescales/environmental-conditions/material-properties. These outcomes will be assessed within the course by homeworks and an in-depth class project as well as part of a written exam at the end of the student's second year.

### **Course credit (i.e. the part that is important to read...):**

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

- 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 field-trip 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 ~10-15 minute oral presentation to the class (during finals week) and 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 in the middle of the semester.

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 the bulk of the grade so you should expect to put some serious work into it

Homeworks/Labs	30%	
Fieldtrip participation	15%	
Project: Mid-term abstract	15%	55%
Project: Finals Week Oral	20%	
Project: Final Write-up	20%	

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

**General Policies:**

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

Since this is a graduate-only class there's no lecture attendance policy. You have the responsibility for learning all the material.

**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, you are welcome to let me know so that we can discuss options. You are also encouraged to contact Disability Resources (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

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

**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, reading a newspaper, making phone calls, web surfing, etc.).

**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>.

### **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>.

### **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>

### **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.

**Topics and Timetable:**

Expect adjustments throughout the course.

Week starting	Monday	Wednesday	Friday	Notes
26-Aug	Course Introduction & Forming Planetary Crusts	Forming Planetary Crusts		
2-Sep		Forming Planetary Crusts	Gravity and Topography	Labor Day
9-Sep		Gravity and Topography	Tectonic Processes	HiRISE Team
16-Sep				EPSC/DPS
23-Sep				CaSSIS Team/Discovery Responses?
30-Sep	Tectonic Processes	Planetary Heating		
7-Oct	Volcanic Processes	Volcanic Processes		
14-Oct	Volcanic Processes	Impact cratering		Discovery Responses?
21-Oct	Impact cratering	Impact cratering		
28-Oct	Surface processes on airless bodies	Weathering & fate of sediments		
4-Nov	Fluvial Processes	Fluvial Processes	FIELDTRIP	
11-Nov		Fluvial Processes		Veterans' Day
18-Nov	Aeolian Processes	Aeolian Processes		
25-Nov	Solar system ices	Solar system ices		
2-Dec	Glacial/Periglacial processes	Glacial/Periglacial processes		
9-Dec	History of the inner solar system	History of the inner solar system		AGU week
16-Dec	Project presentations	Project presentations		Finals Week