

Syllabus – Fall 2021 – PTYS/GEOS 554

Evolution of Planetary Surfaces

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

- The class modality is 'In-Person'
- Lectures on Tuesday and Thursday from 12.30pm to 1:45pm.
- First lecture on Tuesday, August 24th.
- Lectures will be held in room 330 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:

<https://d2l.arizona.edu/d2l/home/1065936>

The COVID Situation:

As we enter the Fall semester, the health and wellbeing of everyone in this class is the highest priority. Accordingly, we are all required to follow the university guidelines on COVID-19 mitigation. For the latest guidance, visit:

<https://covid19.arizona.edu>

Everything in this syllabus assumes we can continue with the class as planned, but plans could change – drastically. There is traditionally a fieldtrip associated with this class that I hope we can do, but it's certainly at risk as the Delta variant spreads.

So please be patient with the wait-and-see approach, I don't think it's possible to plan everything between now and December with certainty.

In addition, we've all been through the wringer in the last 18 months so it's a priority that we cut each other some slack. If you're having any difficulties, then please let me know. The course is a team effort, so I depend on communication from you to know that we're still on track.



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. I can record lectures so you won't miss anything. Stay home if you have even a small doubt about your health.

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.

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.

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>

Life challenges:

If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The [Dean of Students Office](#) can be reached at (520) 621-2057 or DOS-deanofstudents@email.arizona.edu.

Physical and mental-health challenges:

If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

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	Tuesday	Thursday	Notes
23-Aug	Course Introduction	Forming Planetary Crusts	
30-Aug	Forming Planetary Crusts	Forming Planetary Crusts	
6-Sep	Gravity and Topography	Gravity and Topography	
13-Sep	Tectonic Processes	Tectonic Processes	
20-Sep	Impact cratering	Impact cratering	
27-Sep	Impact cratering	Surface processes on airless bodies	
4-Oct	Planetary Heating	Volcanic Processes	
11-Oct	Volcanic Processes	Volcanic Processes	
18-Oct	Glacial/Periglacial processes	Glacial/Periglacial processes	
25-Oct	Weathering & fate of sediments	Fluvial Processes	
1-Nov	Fluvial Processes	Fluvial Processes	FIELDTRIP?
8-Nov	Aeolian Processes		Veterans' Day
15-Nov	Aeolian Processes	Solar system ices	
22-Nov	Solar system ices		Thanksgiving
29-Nov	Geologic History of the Moon & Mercury	Geologic History of Mars	
6-Dec	Geologic History of Venus		Reading Day
13-Dec			Finals Week