

PTYS ###X Introduction to Planetary Science for Teachers
Online: 3 credit hours
Fall 2014

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Online and in-Office hours: Mon and Wed 1-3 pm or by appointment

Instructor of Record: Shane Byrne, Department of Planetary Science

The general objective of this course is to provide an introduction to the dynamic range of processes, features, and histories of the solar system and its bodies. We'll take a tour of solar system formation, compare surface processes (e.g. impact cratering, volcanism) on different planets, discuss near earth asteroids and their interaction with Earth, and a host of other exciting topics. Our knowledge of what is happening in space around us has grown dramatically in the last several decades as we send more spacecrafts out to distant planets and places. We will discuss what kinds of data those spacecraft collect, how we use it to explore the solar system, and what kinds of discoveries we've made about our planet-neighbors.

This is an introductory course designed to provide a basic framework of planetary science content for high school and middle school science teachers. It will not focus on the application of content in other classrooms, however some activities will be included to help students adapt content for their own use.

All discussion, activities, and lectures will be done entirely online through the University's D2L system. Opportunities for synchronous discussion can be arranged if there is sufficient interest. The course will be primarily narrative driven, but students should have a basic knowledge of algebra. In general, we will have three major areas of focus: **basic content, scientific data, and scientific literacy**. A list of topics is provided at the end of this syllabus.

Instructional Objectives: By the end of this course, students will be able to:

1. **Describe** a basic, conceptual framework of the history, structure, and nature of the solar system and the bodies that make it up.
2. **Identify and be able to explain** the fundamental processes that govern the solar system, and how they contribute(d) to the formation or development of key features.
3. **Identify** some types of scientific data collected by spacecraft instruments, and **summarize** how they are used to explore the solar system.
4. **Compare and critically analyze** how science is presented in the media, online, and by scientific literature.
5. **Synthesize and adapt** some content from the course for use in students' own classrooms.

Activities/Assignments:

1. **Initial Assessment:** Survey about yourself, your interests and goals for the course, and your level of background knowledge. (15 pts)

2. **Weekly Activities:** Assignments, guidelines, and due dates will be posted on the D2L site. These will include reading/video assignments, weekly activities, and group discussions in the online forum. Readings and videos will take the place of the traditional in-class lectures. Because this is an online course, we cannot do in-class activities to supplement those “lectures.” The activities posted each week will fill the role of both in-class work and homework, and are designed to engage students in exploring the content beyond simply consuming lecture materials. Each assignment will end with a discussion prompt to be discussed in the online forum. (30 pts for activities, 10 pts for discussion)
3. **Writing Assignments:** There will be two short writing assignments aimed at critically analyzing how science is perceived by our society and/or how it is mis/represented in the news or other media. (40 pts each)
4. **Final Project:** The final project will be aimed at adapting course content for use in students’ own classrooms. (50 pts for the project, 25 for participation and peer evaluation)

Percentage of points required to be assured of the following grades:

- A (earning 90-100% of total points)
- B (earning 80-89% of total points)
- C (earning 70-79% of total points)
- D (earning 60-69% of total points)
- E (earning 59% or less of total points)

Required Texts:

There will not be a required textbook for this course. Recommended texts and references will be posted on D2L.

Additional Materials:

Digital versions of required readings, slides, and videos will be posted on the course website on D2L.

Prerequisites:

There are no prerequisites for this course. No previous knowledge of planetary science is required. The course material is built on a foundation of basic principles in physics, chemistry, and geology, however relevant vocabulary and concepts will be addressed in the required readings, videos, and activities. The course will be primarily narrative driven, but students should be prepared to use basic algebra here and there throughout the semester. Knowledge of scientific notation would be helpful, but will be covered briefly at the beginning of the course.

Computer Requirements:

This course will be conducted online through UA’s course management system Desire2Learn (D2L, <https://d2l.arizona.edu/>) in an asynchronous format. Weekly course readings, activities, discussion prompts, video lectures, resources, and grades will be posted here. In order to access D2L, a computer with internet access and a recent browser will be needed. Most course readings will be provided available in Portable Document Format (PDF), MS Word documents, MS Powerpoint slides, and/or other similar formats. You will need software that can access these

files. If you do not own MS Word, OpenOffice (<https://www.openoffice.org/>) and Adobe PDF Reader (<http://get.adobe.com/reader/>) can be obtained and used for free. GoogleDocs is also free and has these capabilities. Please contact me if you have questions regarding any of this.

COURSE COMMUNITY AND POLICIES

1. Creating a Constructive Learning Community

In order to create and maintain a safe and constructive learning environment, we will strive to be as respectful as possible through all of our communications. This includes both respect for each other's time and opinions. You are all hard-working teachers, and we have a limited amount of time for this class, but some sections of the class rely on group discussion or activities. I ask that everyone fully participate in an active and respectful manner in order to maximize learning potential for all students. Please communicate with me and your colleagues if any potential situations come up that may affect your participation. All members of the class reserve the right to enforce policies, including asking an individual to cease or modify their behavior.

Course Atmosphere: We want this course to be educational, fun, and inspiring. Planetary science is a topic that will be new to most of you, and I encourage being candid and asking questions. As long as your contributions and questions are honest, they need to be respected by everyone in the class. Mocking and/or bullying are never allowable. See "Disruptive Behavior Policy" below. The same policies apply to online interactions. **Read the Online Etiquette materials** under Administration and References for specific examples.

I also encourage working together and supporting each other. Scientists rarely work on projects completely alone, collaboration is an inherent and important part of this field. While each student is responsible for completing and turning in their own homework activities, I absolutely encourage students to discuss the material and work on problems together. The goal of this course is to help you all learn, so if you can learn more effectively working on the material with others then I encourage you to do so. Simply copying another's work, however, does not help you or the student you are copying, and is not acceptable.

2. Life and Computer Issues Happen: If life interrupts your ability to turn in an assignment on time, watch a video lecture, or some other issue, please email or call me as soon as you can. Due dates are important! Late assignments will not be accepted unless there is valid justification. Each student is allowed one absence during the semester, in which work and participation for that week will be excused for personal or professional reasons. If any of the readings or activities during that week are of particular importance, the student may be asked to make them up at later time. This will be discussed on a case-by-case basis.

Officially Excused Absences

- a. All University recognized holidays will be honored.
- b. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion.
- c. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

3. Scheduling in an Online Class: Due dates for videos, readings, discussions, and activities will be posted on D2L. If these are not clear, please ask. The course will operate on a weekly schedule, with previous assignments due and new assignments posted on Thursdays. However, this is subject to change due to unforeseen circumstances, holidays, or if the needs of the students make it reasonable to do so.

4. Subject to Change: Due dates are subject to change due to unforeseen circumstances, holidays, or if the needs of the students make it reasonable to do so. Course content and general itinerary is also subject to change. As with any course, we may choose to spend longer on certain topics, or less time on others. This is the first time this course is being offered. **As a brand new course, I'm sure it will have its share of wrinkles to work out.** Any feedback you can offer on how the course is working for you will help me improve your experience throughout the semester, and for future classes. This can include comments/criticisms/suggestions on any aspect of the course, such as logistics, course content, activities, or lectures.

5. University Policy Statements

Statements regarding Academic Integrity, Student Code of Conduct and legal Disability statement come DIRECTLY from the respective websites. References are provided. PLEASE go to these websites and familiarize yourself with your legal responsibilities as a learner.

Student Code of Academic Integrity

Integrity and ethical behavior are expected of every student in all academic work. This Academic Integrity principle stands for honesty in all class work, and ethical conduct in all labs and clinical assignments. This principle is furthered by the student Code of Conduct (<http://deanofstudents.arizona.edu/studentcodeofconduct>) and disciplinary procedures established by ABOR Policies 5-308 through 5-404, all provisions of which apply to all University of Arizona students. (<http://deanofstudents.arizona.edu/codeofacademicintegrity> <http://deanofstudents.arizona.edu/academicintegrityforfaculty>)

While we realize many individuals work “together” within their departments and may “co-author, brainstorm” documents, for this class we REQUIRE all submitted work to be from the author – it must NOT contain the work of others.

Disruptive Behavior in an Instructional Setting: *Disruptive Behavior is Prohibited.*

"Disruptive behavior" means conduct that materially and substantially interferes with or obstructs the teaching or learning process in the context of a classroom or educational setting. Disruptive behavior includes conduct that distracts or intimidates others in a manner that interferes with instructional activities, fails to adhere to an instructor's appropriate classroom rules or instructions, or interferes with the normal operations of the University. Students who engage in disruptive behavior may be directed by the instructor to leave the class for the remainder of the class period. If the student refuses to leave after being requested to do so, the instructor may summon the University Police.

Threatening Behavior in an Instructional Setting: *Threatening Behavior is Prohibited.*

“Threatening behavior” means any statement, communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a

reasonable apprehension of physical harm to a person or property. A student can be guilty of threatening behavior even if the person who is the object of the threat does not observe or receive it, so long as a reasonable person would interpret the maker's statement, communication, conduct or gesture as a serious expression of intent to physically harm.

<http://deanofstudents.arizona.edu/disruptiveandthreateningstudents/threatening.pdf>

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, please meet with us so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

Disability Resource Center • 1224 E. Lowell Street • Tucson, AZ 85721

Phone: 520.621.3268 V/TTY • Fax: 520.621.9423

uadrc@email.arizona.edu

Statement of Copyrighted Materials: Please be advised that all lecture notes, lectures, study guides and other course materials disseminated, whether in class or online, are original materials and as such reflect intellectual property of the instructor or author of those works. All readings, study guides, lecture notes and handouts are intended for individual use. Individuals may not distribute or reproduce these materials for commercial purposes without the express written consent of the instructor. Individuals who sell or distribute these materials for any use other than their own are in violation of the University's Intellectual Property Policy (available at http://www.ott.arizona.edu/uploads/ip_policy.pdf). Violations of the instructors copyright may result in course sanctions and violate the Code of Academic Integrity.

Course Topics

Wk	Date	Title	Topics
1	9/2	Tour of the Solar System	Intro to the structure and attributes of the solar system
2	9/8	Orbital Motion	Basics of orbital motion, seasons, eclipses
3	9/15	Solar System Formation	Solar system and planet formation and evolution
4	9/22	Planetary Interiors	Structure of terrestrial planets, convection, tectonics
5	9/29	Volcanism	Causes of volcanism, Io vs Venus vs Moon/Mercury
6	10/6	Science and the Media	Science perceptions in papers, articles, and the news
7	10/13	Icy Bodies	Icy moons, cryovolcanism, Kuiper belt objects, Pluto
8	10/20	Asteroids & Comets	Comets, near earth asteroids, impact dangers
9	10/27	Impact Cratering	Impact craters, ejecta, surface ages
10	11/3	Science and the Media	Science perceptions in papers, articles, and the news
11	11/10	Atmosphere-Surface Interactions	Water/carbon/temperature cycles, Earth vs Venus vs Mars
12	11/17	Rivers, Lakes, & Oceans	Water on Earth vs Titan vs Ancient Mars
13	11/24	THANKSGIVING	-
14	12/1	Future Science	New missions, astrobiology, exoplanets
15	12/8	Final Projects	Final projects
16	12/18	Final Projects	Final projects