

PTY5/ASTR 206: Exploring our Solar System

Spring 2023

Kuiper Building, room 308

Tuesday/Thursday 2:00 – 3:15 PM

Description of Course

Our Solar System is filled with an incredible diversity of objects. These include the sun and planets, of course, but also many hundreds of moons -- some with exotic oceans, erupting volcanoes, or dynamic atmospheres. Billions of asteroids and comets inhabit the space between and beyond the planets. Each body is unique, and has followed its own evolutionary history. This class will explore our current understanding of the Solar System and emphasize similarities that unite the different bodies as well as the differences between them. We will develop an understanding of physical processes that occur on these bodies, including tectonics, impact cratering, volcanism, and processes operating in their interiors, oceans, and atmospheres. We will also discuss planets around nearby stars and the potential for life beyond Earth. Throughout the class, we will highlight the leading role that the University of Arizona has played in exploring our Solar System.

Course prerequisites or co-requisites: None

Instructor and Contact Information

Dr. Jeff Andrews-Hanna

preferred name: “Jeff”, “Dr. Jeff”

preferred pronouns: (he, him, his)

Kuiper 438

jcahanna@arizona.edu

Office hours: Thursday, 11:00-12:00

I can also be available to meet at other times – please e-mail me to set up a meeting at another time.

Teaching assistants:

Tarunika Ramprasad, tarunika@arizona.edu, Kuiper 509F

Office hours: Wednesday 3:00-4:00

Ricardo (Ricky) Maciel, rmac1039@arizona.edu, Kuiper 351

Office hours: Tuesday 1:00-2:00

Preceptors:

Olivia Yaffe, oyaffe@arizona.edu

Chad Cantin, chadcantin@arizona.edu

Kaycee Ridenhour, kayceer@arizona.edu

All office hours will be held in person, unless otherwise specified. Remote meetings with the TAs or professor can be arranged.

Web information: This course will use a D2L page:

<https://d2l.arizona.edu/d2l/home/1273798>

Course Format and Teaching Methods

Lectures will be in-person in Kuiper room 308 (TR 2:00-3:15). Given the size of the class and ongoing concern over the pandemic, lectures will also be streamed on Zoom. You are encouraged to attend in person. However, if you are feeling ill, have been exposed to covid, are considered to be at high risk, or are otherwise uncomfortable with attending in-person, you are welcome to take part in the class remotely. Recordings will also be available online (D2L – UA Tools - Zoom) for those unable to take part during the lecture period due to illness. *Please note that there will be in-class activities from time to time, which can be done either in-person or remotely, but must be completed within 24 hours of the class period in which they are assigned.*

Zoom Join URL: <https://arizona.zoom.us/j/84206309489>

Class Recordings:

The lectures will be recorded and made available to students. If you do not wish for your name to be visible in the recording, please take appropriate measures in Zoom. For lecture recordings, which are used at the discretion of the instructor, students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UA Arizona values and educational policies are subject to suspension or civil action.

Course Objectives

Students in this class will become acquainted with the properties and histories of their neighbors in the solar system. This course will emphasize not only what we know, but also how we know it. Students will gain a basic understanding of the processes driving planetary evolution. We will also learn about the history of planetary exploration.

Expected Learning Outcomes

General Education Program Outcomes:
Think Critically
Communicate Effectively
Use Information Effectively

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 preapproved by the UA Dean of Students (or dean's designee) will be honored. See <http://policy.arizona.edu/employmenthuman-resources/attendance>.

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 (either in-person, via the livestream or later viewing of the recorded lecture). 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. In exceptional cases, it may be permissible to miss a classroom activity or exam. In such cases, a makeup will be allowed only if you contact the professor in advance (as early as possible) for permission. Excuses after the fact will not be considered.

Makeup Policy for Students Who Register Late

Students who register after the first class meeting may make up missed assignments/quizzes on a timeline set by the professor.

Course Communications

Information pertinent to this course will be conveyed by announcements in class, through messages to your official University of Arizona e-mail address, and by D2L. Students are responsible for being aware of any announcements made in class.

Required Texts or Readings

Introduction to Planetary science: The geological perspective (Faure and Mensing)

Electronic textbook available for FREE through the library:

<https://link-springer-com.ezproxy1.library.arizona.edu/book/10.1007%2F978-1-4020-5544-7>

Required or Special Materials

None.

Required Extracurricular Activities

Students are expected to take part in a planetary observing project outside of class time. There will be multiple options for this project, including nighttime sessions in which we observe features on the Moon through a telescope. There will be multiple opportunities to do this, with dates and times announced in advance. Alternative assignments will also be available.

Assignments and Examinations: Schedule/Due Dates

Grades will be based upon a combination of in-class and outside-of-class work.

In-class work:

In-class activities: (do not require attendance in lecture but must be completed on time) We have a number of in-class activities and discussions over the course of the semester. These are unannounced and participation is mandatory. Students watching the recorded lecture asynchronously will have the same time in which to do the activity. These will not require any time outside of the normal lecture period. Completed activities must be submitted to D2L within 24 hours of the end of lecture. You will often have the option to work in pairs or groups, but each student must upload a completed activity to D2L (this may be a single activity with two or more names at the top). This counts toward your class participation grade. The lowest two in-class activity grades will be dropped.

Exams: This course will include three mid-term exams and one final exam. The exams will cover all aspects of the course. Exams must be taken in-person and during the normal class period. Exams may include multiple choice, fill in the blank, and short answer questions. The dates of the exams will be posted on the class web page and announced in class. Exhibiting suspicious behavior during an exam may result in confiscation of your exam and/or a zero for the exam grade. *Alternative exams will be available for students who are absent either for University-approved activities or due to illness (prior notice required).* Makeup exams will not be allowed for students who do not notify the professor of a valid excuse in advance of the exam period.

Out-of-class work:

Writing assignment: Students will be required to complete a writing assignment. All papers must be turned in electronically through D2L. For this class, your first draft of your paper will be both turned in via D2L and shared with another student, who will provide feedback on the writing quality and content. You will then submit your final draft to D2L for grading. There will be multiple due dates to choose from for the writing assignments (based on topic). More specific details on the writing assignment will follow.

Observing project: Students are required to complete some manner of planetary observing project outside of class time. There will be multiple options for this project, including nighttime sessions in which we observe features on the Moon through a telescope, as well as independent projects or activities. There will be multiple opportunities to do this, with dates and times announced in advance. Alternative assignments will also be available. More details will be provided at a later date.

Un-graded work:

Study guides: Study guides will be made available. These can be thought of as non-graded homework assignments, to help prepare you for the exams. They will not be collected or graded. Nevertheless, you are encouraged to reach out to the teaching assistants, preceptors, or professor for any questions on these.

Writing Requirement

All Tier One and Tier Two General Education Courses are writing intensive (<http://gened.arizona.edu/content/writing-component>). In this course, these writing assignments will provide you with the opportunity to learn more deeply about a topic of interest. Specific topics or choices of topics will be provided.

This course is also a General Education Writing Attribute Course. Writing enters into many aspects of this course, including short written responses in the in-class activities and exams, a short written assignment for the observing project, and a longer essay as the Writing Attribute Signature Assignment on a topic of your choosing. The

Signature Assignment will go through one cycle of peer review by a fellow student and revision prior to final submission.

Final Examination

The final exam will be held on the date/time designated by the registrar, as indicated at:

<https://registrar.arizona.edu/final-exams-spring-2023>

In Spring 2023, the final exam will be on Monday, 5/8/23 from 3:30 PM – 5:30 PM

Final exam regulations can also be found at:

<https://registrar.arizona.edu/final-exams-spring-2023>

Grading Scale and Policies

Letter grades will nominally be assigned based on the following distribution:

A: 90% and higher

B: 80-89%

C: 70-79%

D: 60-69%

F: <60%

The professor may choose to apply a curve to raise the exam grades and the final letter grades if needed, but grades will not be curved down. The curve on exam grades (if any) will be announced at the time the exam is returned.

The different components of the course will be weighted as follows:

Exams: 60% (20%, 20%, 20%)

Writing assignment: 20%

In-class activities/discussions, participation: 10%

Observing project: 10%

Late work policy:

Late work (papers, assignments) without an authorized excuse in advance of the due date will be penalized 5% for each day late up to a 50% penalty.

Late in-class activities will be penalized 33% (1-point penalty for a typical 3-point activity) after the first day, 66% if turned in later than that (2-point penalty for a typical 3-point activity).

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:

An effort will be made to hand back material in a timely manner. Make sure to review all of your graded material as soon as possible. Occasionally errors in grading may occur. If you spot such an error, you must call it to the attention of the TA or instructor within one week.

Honors Credit:

As this is a Tier Two course it is available for Honors credit. Honors contract information is available at <https://www.honors.arizona.edu/honors-contracts>. See the instructor to discuss your ideas for an honors contract.

Covid policies:

As we enter the Spring 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. Please visit www.covid19.arizona.edu for the latest guidance. Currently, face coverings are recommended, but not required in our classroom. Please see the current policy for any changes during the semester (<https://covid19.arizona.edu/face-coverings>). 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.

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.

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, 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.

Please do not use your phones during class unless prompted by the instructor. Turn cell phone ringers off during class. If you absolutely must use your phone during class please inform the instructor before class begins, sit in a seat near the door, and quietly step out of the room when to use the device. Only class-related use of your laptop is allowed (e.g., taking notes, following D2L notes, etc). If your use of a phone, laptop or other device creates a distraction to the instructor or to other students you will be asked to leave, will be considered to be absent for that class, and will not be allowed to return to class until meeting with the instructor. If the behavior continues you will be dropped from the class and reported to the Dean of Students for violating the UA Code of Student Conduct.

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>.

Selling class notes and/or other course materials to other students or to a third party for resale or distributing materials to others 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.

Policy on plagiarism

In this class, we use the *Turnitin* software to evaluate writing assignments for plagiarism, making it virtually impossible to get away with plagiarism. The consequences of a violation are far worse than the consequences of a poorly written essay.

The University of Oxford defined plagiarism as “presenting someone else’s work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement” (<https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism>).

Plagiarism of any form or amount will not be tolerated in this class. Willful acts of plagiarism will be met with the strictest penalties, up to and including immediate failure of the class. Even unintentional plagiarism will be penalized. You are responsible for understanding what constitutes plagiarism and avoiding it in your writing.

The writing assignments may require the use of information from a variety of sources. In such cases, the information must be written in your own words. You need to understand and synthesize such information in order to incorporate it into your writing. It is then necessary to cite the source of the information. Even reproducing the organization of an external source (e.g., taking text from a source and rewriting each sentence, but otherwise preserving the flow of ideas and information) can be considered to be plagiarism. Reproducing words and even phrases is common, and not considered plagiarism until a sufficiently large number of phrases are reproduced in the same order as the source that it becomes clear that the work and ideas are not fully your own. Quotations of sources with appropriate citations do not qualify as plagiarism, but are still discouraged in the writing assignments. I am not interested in what someone else wrote or thought – I am interested in you and your work. Writing assignments must be original work done for this class – writing that you previously turned in for other classes will not be accepted.

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

Policy on exams

No phones or other electronic devices (including smart watches) will be permitted during exams for any reason. Such devices must be turned off before the start of the exam and remain out of sight throughout the exam. Any device brought out during an exam for any reason will be considered as an instance of cheating, and an automatic grade of 0 will be assigned. No one is permitted to leave the room during exams for any reason other than a medical emergency. Use restrooms prior to beginning the exam and bring a water bottle with you if you may need a drink.

This course is a Quantitative Reasoning Attribute General Education course. You may need a calculator and should have one available during exams.

UA Nondiscrimination and Anti-harassment Policy

The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please 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 will create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Please be aware that UA faculty and instructors who work with students are required to report allegations of sex discrimination to the Title IX Office. This means that if you tell me about a situation involving sexual harassment that involves another student or employee, or that happens on campus or in a UA program, I must share that information with the Title IX Coordinator. Although I have to make that notification, you will have choices regarding whether or not you want to pursue a formal complaint against anyone on campus. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone privately, you can contact any of the following on-campus resources:

- Counseling & Psych Services (CAPS), <https://health.arizona.edu/counseling-psych-services>, 520-621- 6490, 520-570-7898 (after hours)
- Oasis Sexual Assault, Relationship Violence, and Trauma Services, <https://health.arizona.edu/counseling-oasis> (same phone as CAPS)
- Campus Health, <https://health.arizona.edu/home>, (520) 621-6490

- University of Arizona Ombuds, <https://ombuds.arizona.edu/>, (520)-626-5589
- Title IX section on sexual assault support & resources (<https://titleix.arizona.edu/title-ix/sexual-harassment-violence>) has more information, as well as a link explaining options if you have a concern, need assistance/support, or would like to file a complaint.

Additional Resources for Students:

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

Campus Health <http://www.health.arizona.edu/> Phone: 520-621-9202

Counseling and Psych Services (CAPS)

<https://health.arizona.edu/counseling-psych-services> Phone: 520-621-3334

CAPS provides mental health care, including short-term counseling services.

The Dean of Students Office's Student Assistance Program

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Student Assistance helps students manage crises, life traumas, and other barriers that impede success.

Email: DOS-deanofstudents@email.arizona.edu Phone: 520-621-7057

Survivor Advocacy Program

<https://survivoradvocacy.arizona.edu/>

Email: survivoradvocacy@email.arizona.edu Phone: 520-621-5767

Campus Pantry

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. In addition, the University of Arizona Campus Pantry is open for students to receive supplemental groceries at no cost. Please see their website at: campuspantry.arizona.edu for open times. Furthermore, please notify me if you are comfortable in doing so. This will enable me to provide any resources that I may possess.

Preferred Gender Pronouns:

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is on the class roster, please let me know. Feel free to correct instructors on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me directly in class or via email (jcahanna@arizona.edu).

Students may designate pronouns they use to identify themselves. To change your listed pronoun on UAccess, navigate to the Student Self Service page, go to the personal information section, and click on "Names". Options include (he, him, his), (she, her, hers), (they, them, theirs), (xe, xem, xyr), and (ze, zir).

More information on updating your preferred name and pronouns is available on the Office of the Registrar site at <https://www.registrar.arizona.edu/>.

Preferred name:

University of Arizona students may choose to identify themselves within the University community using a preferred first name that differs from their official/legal name. A student's preferred name will appear instead of the person's official/legal first name in select University-related systems and documents, provided that the name is not being used for the purpose of misrepresentation. Students are able to update their preferred names in UAccess.

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/student-information>

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.

Land acknowledgement

The University of Arizona resides on ancestral lands of the Tohono O'odham and Pascua Yaqui nations, where many today continuously reside in their ancestral land. I acknowledge the privilege it is to teach and learn in this region and I express my gratitude to these nations. I also acknowledge the historical and present-day injustices

that many indigenous peoples have suffered at the hands of those in power, including the loss of their ancestral lands, and the grave inequities that persist today as a result.

Classroom community

My goal is to establish this class as a community of mutual respect. I believe that diversity is a critical part of science – diversity of ideas, diversity of perspectives, and diversity of individuals. I appreciate the fact that each student brings their own history and perspective to the class. I recognize that many in our campus community have faced discrimination and bias throughout their educations and their lives, particularly people of color and other under-represented minorities. I expect that everyone in this class will treat everyone else with respect at all times. If at any time you feel that I have failed to treat you with respect, I ask you to speak with me to help me to understand my failing or to clear up any misunderstanding.

Scheduled Topics/Activities:

Provisional schedule

NOTE: All dates, topics, etc are subject to change. Please pay attention to course announcements

Lecture	date	day	Lecture topic
1	1/12/23	R	Introduction
2	1/17/23	T	Ancient astronomy
3	1/19/23	R	Fundamentals
4	1/24/23	T	Fundamentals
5	1/26/23	R	Solar System Origin
6	1/31/23	T	Moon
7	2/2/23	R	Moon
8	2/7/23	T	Moon
9	2/9/23	R	Mercury
10	2/14/23	T	Mercury
11	2/16/23	R	Venus
12	2/21/23	T	Venus
13	2/23/23	R	Exam 1
14	2/28/23	T	Mars
15	3/2/23	R	Mars
	3/7/23	T	SPRING BREAK
	3/9/23	R	SPRING BREAK
16	3/14/23	T	Mars
17	3/16/23	R	Mars
18	3/21/23	T	Jupiter and its Moons
19	3/23/23	R	Jupiter and its Moons
20	3/28/23	T	Jupiter and its Moons
21	3/30/23	R	Astrobiology
22	4/4/23	T	Astrobiology
23	4/6/23	R	Exam 2
24	4/11/23	T	Saturn and its Moons
25	4/13/23	R	Saturn and its Moons
26	4/18/23	T	Uranus and Neptune
27	4/20/23	R	Pluto and Charon
28	4/25/23	T	Extrasolar planets
29	4/27/23	R	Extrasolar astrobiology
30	5/2/23	T	Review
	5/8/23		FINAL EXAM