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.

Instructor and Contact Information
Dr. Jeff Andrews-Hanna
Kuiper 438
520-626-3338
jcahanna@lpl.arizona.edu (preferred mode of contact)
Office hours: Tuesday, 2:30-3:30 PM, Kuiper 438
I am also available to meet at other times – please e-mail to set up a meeting

Teaching assistant:
Nathan Hendler
equant@email.arizona.edu
Kuiper 318
office hours: Monday/Wednesday 3:00-4:00

Web information: This course will use a D2L page:
https://d2l.arizona.edu/d2l/home/880546

Course Format and Teaching Methods
This is primarily a lecture course. Lectures will be supplemented by in-class discussions and activities. One project will also entail out-of-class activities (telescopic observing).

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. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

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
Statement on whether students who register after the first class meeting may make up missed assignments/quizzes.

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.

Required Texts or Readings
Introduction to Planetary science: The geological perspective (Faure and Mensing)
Electronic textbook available for FREE through the library:

Required or Special Materials
None.

Required Extracurricular Activities
Students are expected to take part in a guided telescopic observing project outside of class time. There will be multiple opportunities to do this, with dates and times announced in advance. Students unable to take part in this activity will be given an alternative assignment.

Assignments and Examinations: Schedule/Due Dates
Papers: Students will be required to complete two writing assignments, one of which will require a revision. All papers must be turned in electronically through D2L.

Homework assignments: Homework assignments will be assigned on a regular basis, due on the second class (one week) after assigned. All homework assignments must be turned in electronically through D2L.

In-class activities: We have a number of in-class activities and discussions over the course of the semester. These are unannounced and attendance is mandatory. If you will miss class for an approved reason, you must let the instructor know in advance, and a makeup activity can be assigned if needed.

Exams: This course will include two mid-term exams and one final exam. The exams will cover all aspects of the course, including in-class work and homework. Exams are taken in the normal classroom setting, and 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 (prior notice required), or due to illness (documentation required within 24 hours).

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.

Final Examination or Project
The final exam will be held on the date/time designated by the registrar, as indicated at: http://www.registrar.arizona.edu/schedules finals.htm
In Spring 2020, the final exam will be on Monday, May 11th from 3:30 PM – 5:30 PM

Final exam regulations can be found at: https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information?audience=students&cat1=10&cat2=31

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 final letter grades if needed, but grades will not be curved down.
The different components of the course will be weighted as follows:

- Writing assignments: 20% (10%, 10%)
- Exams: 50% (15%, 15%, 20%)
- In-class activities/discussions, participation: 15%
- Observing project: 5%
- Homework: 10%

**Late work policy:** Late work (papers, homeworks) without an authorized excuse in advance of the due date will be penalized 10% the first day they are late, and 5% each subsequent day.

**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](http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete) and [http://catalog.arizona.edu/policy/grades-and-grading_system#Withdrawal](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](https://www.honors.arizona.edu/honors-contracts). See the instructor to discuss your ideas for an honors contract.

**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.).

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 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) to explore reasonable accommodation. Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

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 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 swatches) 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.

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. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students
UA Academic policies and procedures are available at http://catalog.arizona.edu/policies. Student Assistance and Advocacy information is available at http://deanofstudents.arizona.edu/student-assistance/students/student-assistance

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.
Scheduled Topics/Activities:

Provisional schedule

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

<table>
<thead>
<tr>
<th>Lecture #</th>
<th>Date</th>
<th>Day</th>
<th>Lecture Topic</th>
<th>Contents</th>
<th>Papers</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1/16/20</td>
<td>R</td>
<td>Ancient Astronomies</td>
<td>Mayan, other ancients, Greeks, Romans, early European</td>
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<td>2</td>
<td>1/21/20</td>
<td>T</td>
<td>Greeks and Romans</td>
<td>Big bang, timeline, stars, planetary formation, asteroids, LH8</td>
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<td>3</td>
<td>1/23/20</td>
<td>R</td>
<td>Fundamentals</td>
<td>Plate tectonics, earthquakes, volcanoes</td>
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<td>4</td>
<td>1/28/20</td>
<td>T</td>
<td>Solar System Origin</td>
<td>Climate, water</td>
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<tr>
<td>5</td>
<td>1/30/20</td>
<td>R</td>
<td>Earth</td>
<td>Exploration, space race, Apollo</td>
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<td>6</td>
<td>2/4/20</td>
<td>T</td>
<td>Earth</td>
<td>Formation, magma ocean, impact basins, maria</td>
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<td>7</td>
<td>2/6/20</td>
<td>R</td>
<td>Moon</td>
<td>Recent history, ice at poles, future exploration</td>
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<td>8</td>
<td>2/11/20</td>
<td>T</td>
<td>Mercury</td>
<td>Exploration, structure, magnetic field, Volcanism, tectonism</td>
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<td>9</td>
<td>2/18/20</td>
<td>T</td>
<td>Venus</td>
<td>Exploration, atmosphere, tessera, plains, rifts</td>
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<td>10</td>
<td>2/20/20</td>
<td>R</td>
<td>Venus</td>
<td>Venus and Earth? Evolution,</td>
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<td>11</td>
<td>2/25/20</td>
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<td>EXAM 1</td>
<td>Ancient astro through Mercury</td>
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<td>12</td>
<td>2/27/20</td>
<td>R</td>
<td>Venus/Mars</td>
<td>Early Ideas, exploration, geologic timescale</td>
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<td>13</td>
<td>3/3/20</td>
<td>T</td>
<td>Mars</td>
<td>Early evolution and climate</td>
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<td>14</td>
<td>3/5/20</td>
<td>R</td>
<td>Mars</td>
<td>Early evolution and climate</td>
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<td>SPRING BREAK</td>
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<td>SPRING BREAK</td>
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<td>3/24/20</td>
<td>T</td>
<td>Mars</td>
<td>Late evolution</td>
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<td>20</td>
<td>3/26/20</td>
<td>R</td>
<td>Jupiter and its Moons</td>
<td>Jupiter, satellites, resonances, Io</td>
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<td>21</td>
<td>3/31/20</td>
<td>T</td>
<td>Jupiter and its Moons</td>
<td>Europa, Ganymede, Callisto</td>
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<tr>
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<td>4/2/20</td>
<td>R</td>
<td>Astrobiology</td>
<td>Requirements for life, origin of life</td>
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<tr>
<td>23</td>
<td>4/7/20</td>
<td>T</td>
<td>EXAM 2</td>
<td>Venus, Mars, Jupiter</td>
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<tr>
<td>24</td>
<td>4/9/20</td>
<td>R</td>
<td>Astrobiology</td>
<td>Life in extreme environments, search for life</td>
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<tr>
<td>25</td>
<td>4/14/20</td>
<td>T</td>
<td>Saturn and its Moons</td>
<td>Saturn, regular and irregular satellite overview</td>
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<tr>
<td>26</td>
<td>4/16/20</td>
<td>R</td>
<td>Saturn and its Moons</td>
<td>Enceladus, Titan, and Iapetus</td>
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<tr>
<td>27</td>
<td>4/21/20</td>
<td>T</td>
<td>Uranus and Neptune</td>
<td>Ice giants, satellites, Triton</td>
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<tr>
<td>28</td>
<td>4/23/20</td>
<td>R</td>
<td>Pluto and Charon</td>
<td>New discoveries from New Horizons</td>
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<tr>
<td>29</td>
<td>4/28/20</td>
<td>T</td>
<td>Extrasolar planets</td>
<td>Detection methods, properties</td>
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<tr>
<td>30</td>
<td>4/30/20</td>
<td>R</td>
<td>Astrobiology discussion</td>
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