

ASTR 1000-002: The Solar System – Fall 2019
Monday/Wednesday/Friday 2:00 pm – 2:50 pm, Duane G1B20
<http://canvas.colorado.edu>

Goals:

1. Instill the idea that we are all scientists
2. Instill an appreciation of the many ways in which science influences our everyday lives
3. Convey a sense of excitement associated with scientific discovery
4. Demonstrate that science naturally evolves to explain “how” (**not** “what”, and rarely “why”)
5. Illustrate that a few scientific concepts explain many diverse phenomena
6. Encourage use of the scientific method to determine ‘best explanations’ for observed phenomena

Content:

This course is a one-semester introduction to the science of solar system astronomy. We will discuss motions in the night sky and the historical progression that led to their understanding, the current theory for solar system formation, planetary geology, planetary atmospheres, and applications to our current understanding of planets, moons, and small bodies in our solar system. We will discuss planets around other stars as well (exoplanets!), an exciting growth field in astronomy discovery.

Format:

The course will meet three times per week for 50 minutes. Meetings will consist of a mixture of classroom lecture, demonstrations, and active learning (discussion, clicker questions, etc.). We will hold class in Fiske Planetarium a few times this semester. In addition to the meetings at the regularly scheduled class time, there will be opportunities to engage with the course material in a guided manner at night, when the planets are visible. Several nights have been reserved at the telescopes of the Sommers-Bausch Observatory (SBO) on campus, with details provided later in the semester.

University Science Requirement:

This course can help fulfill the A&S Core: Natural Science Sequence or Natural Sci Non-Sequence requirement, the A&S General Education: Distribution-Natural Sciences and MAPS: Natural Science. Contact José Aburto (Jose.Aburto@colorado.edu) in the APS department with questions.

Required Items:

- Textbook: *The Cosmic Perspective 9th Edition*, by Bennett, Donahue, Schneider, and Voit (Addison Wesley). Purchase new, used, or electronically: 8th, 7th and 6th editions are all ok.
- An account on MasteringAstronomy.com. Comes bundled with new textbooks, or can be purchased separately. Detailed instructions available on Canvas. If you have a used textbook, access codes can be purchased separately. Come talk to us if you need help.
- An iClicker available at the CU bookstore. New textbooks come with a discount coupon.

Course Web Site:

All course materials, announcements, and grades will be posted on Canvas at <http://canvas.colorado.edu>. **If you need something course-related, go here first!**

Instructor: Ben Brown (bpbrown@colorado.edu; 303-492-8647)
Help Times: Mondays 12:30-2:00pm in Duane D-115
By appointment

Teaching Assistant: Abhishek Kumar (Abhishek.Kumar@colorado.edu)
Help Times: Mondays 3:00-5:00pm in Duane D-232

Anticipated Course Schedule (subject to change)

Mon		Wed		Fri	
Aug 26	Welcome C1	Aug 28	Scale of the Solar System	Aug 30	The Night Sky C2
Sep 02	<i>Memorial Day</i>	Sep 04	Daily Motions in the Sky C2 (Fiske)	Sep 06	Annual Motions in the Sky C2 HW 1 due
Sep 09	Lunar Motion C3	Sep 11	The Wanderers	Sep 13	Phases of the moon C4 (Fiske) HW 2 due (MA)
Sep 16	Science of Astronomy C4	Sep 18	Kepler's Laws HW 3 due	Sep 20	Dynamic Earth C1-4 review
Sep 23	Exam 1 (Review session Fri Sep 23)	Sep 25	Motion and Forces C7, C8	Sep 27	Motion and Forces C7, C8
Sep 30	Gravity C8	Oct 02	Conservation laws HW 4 due (MA)	Oct 04	Scientific Methods C9
Oct 07	Solar System Formation C9	Oct 09	Planetary Interiors HW 5 due (MA)	Oct 11	SS Architecture (Fiske)
Oct 14	Planetary Surfaces C14	Oct 16	The Sun HW 6 due	Oct 18	Solar Superstorm C5
Oct 21	Exam 2 (Review session Fri Oct 21)	Oct 23	Learning from Light	Oct 25	Learning from Light C10
Oct 28	Spectra C10	Oct 30	Planetary Atmospheres HW 7 due (MA)	Nov 01	Planetary Atmospheres C10
Nov 04	Planetary Climate C11	Nov 06	Climate Evolution HW 8 due	Nov 08	Goldilocks Planets C11
Nov 11	Jovian Planets and Moons C12 (Fiske)	Nov 13	Jovian Atmospheres HW 9 due (MA)	Nov 15	Jovian Rings C13
Nov 18	Exam 3 (Review session Fri Nov 18)	Nov 20	HW 10 due	Nov 22	Exoplanets C13 (Fiske)
Nov 25	<i>Thanksgiving Break</i>	Nov 27	<i>Thanksgiving Break</i>	Nov 29	<i>Thanksgiving Break</i>
Dec 02	Life in the Solar System C13, C24	Dec 04	Life beyond HW 11 due (MA)	Dec 06	Student's Choice or Special topic
Dec 09	Student's Choice or Special topic	Dec 11	The Last Lecture	Dec 13	<i>Reading Day</i>

Final Exam: Monday December 16, 1:30-4:00 pm in the lecture hall

- Reading for each lecture is labeled 'C#', and refers to the Chapter number in the textbook.
- SBO observing nights are Aug 28, Sep 17, Oct 08, Oct 23, Nov 05 & Dec 04. The nights we have available will be the only dates for our class, regardless of weather or cloud conditions. So don't wait until the end of the semester to go (I advise visiting on one of the first three opportunities)!

Course Evaluation:

30%	Final exam	(Dec 16, 1:30-4:00pm)
30%	Mid-term exams	(drop lowest one of three scores)
30%	Weekly homework	(drop lowest one of eleven scores)
10%	Clicker questions	(drop lowest 5 of ~25 scores, or replace with lowest mid-term)

I plan to start with an absolute grading scheme (90/80/70/60 for A/B/C/D, with +'s and -'s within these ranges). These numbers may go lower but not higher. This is intended to encourage students to learn together – everyone can earn higher grades. I would be happy if everyone does well!

Exams:

Exams will emphasize the application of concepts discussed in the course (not the facts themselves). They will consist of a mixture of true/false, multiple choice, short answer, and more detailed written questions. This mixture minimizes the influence of ‘question type’ on the assessment of your facility with the material. The final exam will be cumulative, with similar format to the midterms. There are no make-up exams even for excused absences; many students will have to miss one exam during the semester, and I accommodate this by dropping one score.

Homework:

Homework assignments provide an opportunity to reflect on the concepts discussed in lecture, and verify that each of you understands and can apply them on your own. There will be eleven homework assignments due on Thursdays at the start of class. Homework turned in after the first five minutes of class will be accepted with a 20% late penalty. No late homework will be accepted after I leave the lecture hall – no exceptions. Nominally, five assignments will be on-line and five will be written. While you are welcome to work together on written HW, it must be submitted in your own words.

The lowest homework grade will be dropped. In addition, one homework score can be replaced with full credit for attending one of the observing sessions at SBO and completing a short assignment. One more homework score can be replaced with a typed 2-3 page essays (Due Dec 7) that will require you to reflect on the course material from a non-technical perspective. Topics will be posted at Canvas about one month before they are due. They might not be announced in class.

Clicker Questions:

Clicker questions will be asked in most lectures to test your understanding of the concepts *as they are being taught*, and to promote discussion with your peers about the course material. To keep the focus on discussion, and not on right vs. wrong answers, a typical question will be worth three points. Two points will be awarded for any answer, and one more point will be awarded for the correct answer. Your clicker percentage for each day will be calculated, and each day will be weighted equally. Research shows that use of clickers can dramatically improve student understanding, (and therefore student grades). Note that you must attend class regularly to achieve a good clicker score. Your clicker score will be automatically replaced with your lowest midterm exam grade if it benefits you.

Advice for success in this course:

- Attend lectures and stay to the end. Take notes. Participate. Try **not** to be passive.
- Read the textbook. Skim the material before class, and try to come prepared with one question.
- Study answers to HW questions, midterms, and clicker questions. You will see them again!
- Seek help if you are having trouble. I like visitors. So does Abhishek.
- Study with classmates. Work together, but write-up HW on your own and in your own words.
- Stay up-to-date on Canvas. All important information will be reflected there.
- Don't cheat. Please. Or lie. If you do, you'll have to choose a consequence.

What follows is University legalese. I will abide by these statements, but it is worth noting that it can all be boiled down to the following statement: **I will treat you with respect and as a unique human being. Please do the same for each other and for me. Together we can create an environment of learning and exploration.**

ACCOMMODATION FOR DISABILITIES

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see [Temporary Medical Conditions](#) under the Students tab on the Disability Services website and discuss your needs with Ben.

CLASSROOM BEHAVIOR

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name, **and I call on students by name based on this roster**. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on [classroom behavior](#) and the [Student Code of Conduct](#).

HONOR CODE

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the [Honor Code Office website](#).

SEXUAL MISCONDUCT, DISCRIMINATION, HARASSMENT AND/OR RELATED RETALIATION

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct intimate partner abuse (including dating or domestic violence), stalking, protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, [anonymous reporting](#), and the campus resources can be found on the [OIEC website](#).

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

RELIGIOUS HOLIDAYS

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, **you must contact me within the first two weeks of the semester to make alternative arrangements**. See the [campus policy regarding religious observances](#) for full details.

Have a great semester!

(and thanks Dave Brain!)