AST 111 Introduction to Solar System Astronomy (Fall 2021)

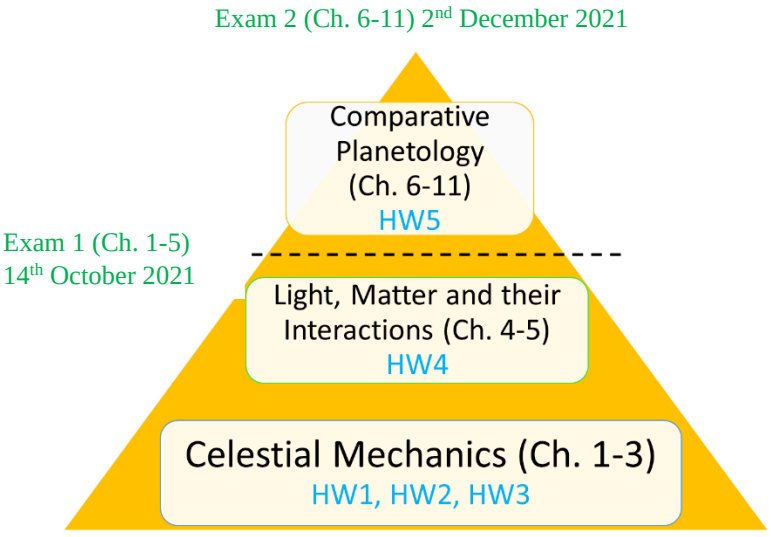
Class: Tu/Th 1:30-2:45pm
Lecture room: Tempe campus - ISTB4 185 (Marston theatre). If the class moves online, remote teaching will be done via zoom (link shared later).
Credit: 4
Prerequisite courses: None

Faculty: Dr. Maitrayee Bose (address me as Dr. Bose or Prof. Bose)
Office Hours: Tu/Th 1:00-1:30pm and 2:45-3:15pm, before and after class
Mode of communication: Office Hours, *Canvas* email, Schedule a zoom meeting using *Canvas* email
Teaching Assistant: Marah Brinjik | Office Hours: TBD | Email: mbrinjik@asu.edu

This document is our mutual contract: READ IT – your grade depends on it

Description of the course

This 4-credit hour course is intended for non-science majors who are curious about the universe and our Solar System. This class provides an overview of the planets, moons, and small bodies in our solar system, planets identified around other stars, telescopic observations and spacecraft missions. The students will learn the basic laws that govern the motion of planetary bodies in our solar system, how to observe the objects in the night-sky and the phenomena observed in our daily lives, like seasons, phases of the moon, eclipses, and climate change. The key principles that govern matter, light, and their interactions that allow us to make observations of the planets from earth or from Space will be discussed. The surface geology and atmospheres of the planets and their satellites in our Solar System will be compared to understand the processes at play in the inner and outer solar system objects.
The course is roughly divided into 3 categories (Figure below): Orbital Mechanics, Light and Matter Interactions and Comparative Planetology. The chapters associated with each category, exam dates, and HW#s are listed in the figure and in the *Assignment Schedule* at the end of the syllabus. You are required to complete all assignments in a timely manner.



Learning Outcomes

- Students will be able to describe, observe and interpret the objects observed in the night-sky that includes the Sun, moon, and planets in our Solar System.
- Students will develop a qualitative and quantitative understanding of the scientific laws describing the motion of planets and effects of gravity.
- Students will analyze the processes prevalent in different planetary surfaces and their interiors.
- Students will identify and explain the differences in the planetary surface and bulk properties.

Canvas

Our class will utilize ASU's Canvas system. I will post all lectures on Canvas before the lecture is given. If you are new to ASU and have not heard about Canvas, please go to your MyASU to learn more. *IMPORTANT: Whichever email address ASU's Canvas has for you is the email address from which you will receive all of our class announcements*. It is your responsibility to check that email address regularly because important information about homework assignments, hints, changes in due dates, exam information etc will be sent from Canvas. So, if you are not checking that email account regularly, you will loose points.

Course Access

The course can be accessed by both my.asu.edu and canvas.asu.edu. Please bookmark both links. You will need to login to the zoom sessions using your asu email id.

Textbooks

1. EXPLORATIONS An Introduction to Astronomy By Thomas T. Arny and Stephen E. Schneider. online 9th edition. We will be using this textbook in conjunction with Connect, the publisher's learning tools. Your registration into this course gives you instant access to the textbook as a "SmartBook" (essentially an interactive ebook) as well as the bulk of the assignments you need for this course. The first time you access Connect, you will be asked to set up a username and password that you will use for the entire session.

This is a unique textbook designed to help you learn key concepts on your own. Nearly all the information in the book is built around illustrations and photographs, rather than being in long blocks of text. The entire book consists of a series of two-page spreads organized into chapters. Each two-page spread is a self-contained block of information about a specific topic and has a short list indicating what you should be able to do before you leave these pages. The items from these lists, for which you will be held responsible for knowing, are compiled into a *What-To-Know List* that is downloadable from this course's Canvas website. The *What-To-Know List* is your guide to what is important, and all assignments are derived from this list. If, when studying from the book, you construct your own answer to each item on the *What-To-Know List*, then I predict you will receive an A in the class. Required reading is listed in each chapter's *What-To-Know List* and in the *Assignment Schedule* at the end of the syllabus. Each two-page spread in the book has a unique number (e.g., 12.4), and these numbers are referenced for quizzes and other course assignments.

2. In-Class activity: Lecture Tutorials for Introductory Astronomy (3rd Edition) by Prather and Slater [ISBN: 9780321820464]. Questions from this text will be discussed in class. Please do not buy this book. All questionnaires will be provided.

Textbook Access:

For this course, you will be required to purchase Connect, which will contain the Arny & Schneider Explorations: Introduction to Astronomy 9eBook. We will be participating in the Inclusive Access "Opt Out" Program to ensure you pay the lowest possible price for your Connect access ($69). You may "opt out" of Inclusive Access at https://includedcp.follett.com/1230 but know that Connect is *required* and the national cost for Connect is $89. You will begin receiving e-mails in your ASU account about the Inclusive Access "Opt-Out" Program 2-3 days prior to class. You'll continue receiving periodic e-mail reminders through drop/add. On the first day of class, you can log into Canvas and get registered for Connect. Approximately 2 weeks after drop/add, you will see a "materials fee" charge in your ASU account that will be titled: Bkstr Publisher Negotiate Rate.

You may choose to opt out of Inclusive Access, but know you will likely pay a higher price for your Connect access. To opt out, simply click on the link (https://includedcp.follett.com/1230) which will open the "opt out" portal. You will click "Create an Account" and enter your ASU email address. Please note: ASU email addresses are configured in two different ways: firstname.lastname@asu.edu and asurite@asu.edu. The ASU system will only recognize one, so if the first configuration doesn't work, you may need to try the second configuration (Helpful hint: the Follett system will match how your email displays in https://asu.edu/directory). If prior to drop/add, you chose to "opt out", but wish to opt back in, this option is also available.

If you would like to purchase the loose-leaf textbook (not required), you can do so in two ways. First, the ASU Bookstore will offer a print upgrade for a minimal price (approximately $30). This print upgrade is available only for students participating in the Inclusive Access Program. To ensure that only participating students are able to purchase, the book info for the upgrade will NOT appear in the course listing until the first day of classes. At that time, students may purchase either through the Bookstore website or in-person. In-person customers will need to ask for the upgrade at the Text Info counter, as we need to verify enrollment in the program. Second, you can always purchase the loose-leaf textbook through Connect for $25 (free shipping & handling).
Ready to get registered for Connect? Watch this easy to follow Connect registration video - http://video.mhhe.com/watch/xUs68jEUwVnAB2K64eWMgc

Teaching Philosophy

The material in this course will be presented in class using an active, inquiry-based learning method, where the students will learn to observe, think, discuss, and understand the science. Such a mode of learning will be cultivated throughout the entire semester. Students are expected to read listed sub-sections (See the *Assignment Schedule* below) at home, prior to class. Class time will be devoted to introducing the core concepts in the chapters with examples, videos, and in-class activities. In class activities will include graded and ungraded quizzes, multiple-choice questions, and discussions among peers. *Your success depends on how often you read the text-book prior to class, attend lectures, participate in discussion, and ask questions when there is something you don't understand.* Note that a 4-credit hour course, which means that you are expected about 6 hours every week on reading materials and completing assignments.

Participant Success

To be successful:

- check the course daily
- read announcements
- read and respond to email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and colleagues
- monitor the Canvas Calendar to stay on track with due dates
- access ASU Online Student Resources (https://bit.ly/3eQTUN3)

If you are a student of my Fall 2020 class, we agree to adhere to these terms of the contract:

- **Mandatory face coverings in Marston during class.** There are 150 registered students for AST 111 in the Marston theatre and all students attending class in person should be masked because physical distancing is not possible (Note: physical distancing will allow only 35 students in Marston). Please do not attend the class, if you don't have a mask with you. Ask your friends for extra masks or find masks elsewhere (likely available in PSF office on the 7th floor).

  As announced on July 30, 2021 and consistent with CDC guidelines for colleges and universities, Arizona State University strongly recommends that everyone wear a face cover when inside a university building. In certain indoor settings, face coverings will be required. Those settings include all classrooms. Additional information about this policy can be found here: https://www.asu.edu/about/fall-2021#face-coverings & https://www.asu.edu/about/fall-2021.
- **Respect.** I respect you and your views. During remote class discussion, please respect your friends/colleagues around you. Please mute at all times, unless asked. Use the chat box for questions. If you are disruptive, you will be removed from the class on that day and your attendance will not be included. If you continue to show disruptive behavior more than once, I will pursue the topic with the Dean of Students for you to be withdrawn from the course.
- **Rules of Conduct.** All ASU rules and policies apply to our classroom (more on this later on page 8).
- **Attendance.** You are required to attend all lectures, arrive on time online, and stay for the entire duration of the class.
- **Reading.** By being in this class you are committing to reading the prescribed materials before class.
- **Class.** Please use a physical notebook or Onenote to take notes during class and during the discussion period. Be ready to participate during in-class activities.

Submitting Assignments

All assignments, unless otherwise announced, MUST be submitted to the designated area of Canvas. Do not submit an assignment via email. Assignment due dates follow Mountain Standard Time (MST). Click the following link to access the Time Converter (http://www.thetimezoneconverter.com/) to ensure you account for the difference in Time Zones. Note: Arizona does not observe daylight savings time and is aligned with MST year-round.

Assignment Schedule

(Sections listed under Readings are from the Explorations textbook, HW: Homework, D: Discussion session)

Date	Day	HW due date	Chapter	Readings	Key Concepts
8/19/2021	Thu		na		Introduction, Course overview, Policies, Math assessment, Signing up with Tracey/Cheryl?
8/24/2021	Tu		preview	P1, 2, 3, 5	Marston Theatre Presentation by Ric Alling; Cosmic landscape, Astronomical scales, D
8/26/2021	Thu		1	1.1	Celestial sphere, Annual motion of sun, D
8/31/2021	Tu		1	1.2	Seasons, D
9/2/2021	Thu		1	1.3	Phases of the Moon, Eclipses
9/7/2021	Tu	HW1	2	2.1, 2.2	Guest Talk by Cady Coleman; Ancient roots of science
9/9/2021	Thu		2	2.3	Kepler's laws of planetary motion
9/14/2021	Tu	HW2	3	3.1-3.4	Newton's laws, D
9/16/2021	Thu		3	3.5, 3.7	Universal law of gravity, Surface gravity, Conservation laws, D
9/21/2021	Tu		3	3.8	Escape velocity
9/23/2021	Thu	HW3	4	4.2	Properties of light, Electromagnetic spectrum, D
9/28/2021	Tu		4	4.3	Nature of matter and heat, Atoms and spectra, D
9/30/2021	Thu		4		Doppler shift
10/5/2021	Tu	HW4	5	5.4	Telescope fundamentals, D
10/7/2021	Thu				Pre-exam review
10/12/2021	Tu				Fall Break - Holiday!
10/14/2021	Thu				EXAM 1 (Ch. 1-5)
10/19/2021	Tu				Post-exam review, Class review
10/21/2021	Thu		6	6.1, 6.2, 6.4	Earth: interior and atmosphere, D
10/26/2021	Tu		6	6.5, 6.6	Earth: greenhouse effect, magnetic field and spin, D
10/28/2021	Thu		7	7.1, 7.2	Moon: surface, structure and tides, D
11/2/2021	Tu		7	7.3, 7.4	Moon: origin, orbit oddities, D
11/4/2021	Thu		8	8.3	Formation of solar system, age of solar system, D
11/9/2021	Tu		9	9.4	Terrestrial planets, D
11/11/2021	Thu		10		Holiday!
11/16/2021	Tu		11		Outer planets, D
11/18/2021	Thu		11		Small bodies, D
11/23/2021	Tu		12 & 13		Sun & Exoplanets
11/25/2021	Thu				Thanksgiving Break - Holiday!
11/30/2021	Tu	HW5			Pre-exam review
12/2/2021	Thu				EXAM 2 (Ch. 6-11)
6-13 Dec 2021					Final Grades Due

Course Assessment Plan

(1) Smart-book question sets: 10% (Completion score)
(2) In-class quiz (based on Lectures): 20% (one lowest score or missed dropped)
(3) Lecture Tutorials: 20% (Completion score)
(4) Homework: 30% (one lowest score or missed dropped)
(5) Exams: 20% (one lowest score or missed dropped)

I would strongly urge students to not miss class, unless you have real emergencies. If you have to skip a class, make sure to go to Canvas, read the lecture notes and do the work. There is no grade for attendance.
In this class, there is no make-up for in-class quiz, exams, or homework. Because we drop scores for most assignments, this should take care of unexpected events and circumstances. Therefore, there is no need to contact me or the Teaching Assistant about missing classes, exams or in-class activities. If something (COVID, flu) prevents you from missing more than one week of class, please me and I will figure out a way to make up for missed work.

(1) Smart-book Question Sets
You are expected to read prescribed sections in the textbook, ahead of time. During class, a set of questions will be solved in small groups. *You have until next class to finish the smart book questions on that section of the chapter*. You will get full-credit for completing >50% of the questions before the deadline. They will be worth 10 points each.

(2) In-Class Quiz
The in-class activity will be based on the reading material for that class. These quizzes will allow me to assess your understanding of a single concept in class. We will have many in-class quizzes but only 11 of them will be graded. The quiz will involve discussion in pairs or small groups. They will be worth 10 points each. One lowest in-class quiz score will be dropped.

(3) Lecture Tutorials
Participation scores will be given based on the 16 discussion sessions during class (Marked D in the *Assignment Schedule*). These discussion sessions will be done in teams of 5-8 students during class. Each discussion assesses your understanding of specific concepts in a chapter. *The discussion materials will need to be completed and submitted on Canvas within 1 week.* You will get full-credit for completing the discussion materials. They will be worth 10 points each.

(4) Homework
There are 5 homework in my course. Each homework assesses your understanding of the key concepts in a chapter. Students are allowed to discuss the problems with each other.
Unless otherwise noted on the course schedule below, *assignments are due by 11:59pm on the date listed in the Assignment Schedule above*. They will be worth 50 points each. One lowest homework score will be dropped.
Please start your homework early enough to ask for help if you run into technical problems. We will start working on the HW problems in class. You can always turn in homework early. The teaching assistant and I are available to discuss homework questions.

(5) Exams

There are 2 exams based on the categories that this class is divided into. There will be no finals for this course. Both exams will happen during class time. Each exam will be worth 100 points each. The lowest in-class exam score will be dropped. Check the *Assignment Schedule* for the exam dates. There will be no make-up exams.

Exams are open book and notes. Exams are multiple-choice. Exam reviews will be conducted before every exam. A list of problems will be provided during this session, few of which will be solved in class (see dates for the Exam Review). About half of the questions that appear in your exams will be from the exam review. Remaining questions in the exam will be from the homework problems and from the Lecture Tutorials that were discussed in class. All material in the included chapters, whether or not it was covered explicitly in the lecture, is fair game for an exam. However, primarily critical concepts in the course will be evaluated. If you've been reading, attending class and doing the homework diligently, the exam material should be straight-forward.

Final class grade

The total points that you can in this course are shown below:

Summary	**Points**		**Total points**
Smart-book questions: #18. Full credit, if complete. 10 points each.	10	#18×10	180
In-class Quiz: #11. 1 dropped. 10 points each.	10	#10×10	100
Lecture Tutorials: #16. Full credit, if complete. 10 points each.	10	#16×10	160
Homework: #5. 1 dropped. 50 points each.	50	#4×50	200
Exams: #2. 1 dropped. 100 points each.	100	#1×100	100
			740

The total points will be converted into a percentage for the class grade.

Final grade including the class and lab grades

AST 111 is a 4-unit course with a lab component. The content covered in the class and lab are overlapping but they will not be in sync during the semester. The labs are managed by Prof. Rogier Windhorst. Please visit the following website (http://windhorst111lab.asu.edu/) for information and schedule for labs. Note that Prof. Bose cannot answer questions about the lab and Prof. Windhorst cannot answer questions about the class. A few tips posted about labs include:

1) Math Refresher Labs on Mo Aug. 23, then Intro Night Sky week of Aug. 30th.
2) There are NO Labs on the first day of classes Th. Aug. 19.
3) On Schedule pg. ignore anything past Sept. 2, it is not yet firm and depends on monsoons/weather, etc.

The students will get just one grade for AST 111. Prof. Bose will provide an overall grade for AST 111 by combining your grade for the class and the lab. The plan is to take the grade in the lecture and the grade in the lab and average them weighted 3:1 for the final grade.

A final letter grade will be assigned based on the percentage using the Table below.

Total points	**Final Grade**
>95%	A+
>90% and <95%	A
>85% and <90%	A-
>80% and <85%	B+

>75% and <80%	B
>70% and <75%	B-
>65% and <70%	C+
>60% and <65%	C
>55% and <60%	D
<55%	E

No changes on the total points or the final grade will be made for any student, for any amount, and for any reason.

Honors Credit

If you are in the Barrett's Honors College, you can take this class for Honors Credit. I will expect additional work. Please contact me if you are interested in doing this so we can agree on what will be necessary to obtain this credit.

Types of assessment by cognitive level (Blooms' taxonomy) in the Course Assessment Plan

I have based the course assessment plan described above based on research that shows the following: Aligning the course outcomes with the types of assessment and assignments help students learn better. In the Table below, I show what each assessment is trying to help students learn (marked by 'x').

	Remember	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
Teaching	x					
HWs	x	x	x		x	
Exams	x	x	x	x	x	
In-Class Acitivity		x			x	
Participation		x	x		x	

The types of assessments below were decided based on the cognitive level:

- Remember: Fill-in-the-blanks, Multiple-choice questions, drawing diagrams
- Understand: Comparing and/or contrasting two or more theories, events, processes, etc.
- Apply: Problem sets
- Analyze: Concept maps
- Evaluate: Problem sets or range of activities that require judging or conduct systematic inquiry

Additional University policies to be aware of:

Drop and Add Dates/Withdrawals

This course adheres to a compressed schedule and may be part of a sequenced program, therefore, there is a limited timeline to drop or add the course. Consult with your academic advisor and notify your instructor to add or drop this course. If you are considering a withdrawal, review the following ASU policies: Withdrawal from Classes, Medical/Compassionate Withdrawal, and a Grade of Incomplete. Please consult the advisor before dropping the course. There are often suggestions for improvement that you might not have considered.

Grade Appeals

Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the department chair per the University Policy for Student Appeal Procedures on Grades.

Student Conduct and Academic Integrity

Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see http://provost.asu.edu/academicintegrity. Additionally, required behavior standards are listed in the Student Code of Conduct and Student Disciplinary Procedures, Computer, Internet, and Electronic Communications policy, and outlined by the Office of Student Rights & Responsibilities. Anyone in violation of these policies is subject to sanctions.

Students are entitled to receive instruction free from interference by other members of the class. An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per Instructor Withdrawal of a Student for Disruptive Classroom Behavior.

Appropriate online behavior (also knows as *netiquette*) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

The Office of Student Rights and Responsibilities accepts incident reports from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

Copyright Information

The contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course. Any recording of class sessions by students is prohibited, except as part of an accommodation approved by the Disability Resource Center. The instructor reserves the right to delete materials on the grounds of suspected copyright infringement (see ACD 304-10).

Prohibition of Commercial Note Taking Services

In accordance with ACD 304-06 Commercial Note Taking Services, written permission must be secured from the official instructor of the class in order to sell the instructor's oral communication in the form of notes. Notes must have the notetaker's name as well as the instructor's name, the course number, and the date.

Course Evaluation

Students are expected to complete the course evaluation. The feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available.

Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Please remember to check your ASU email and the course site often.

Accessibility Statement

In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act as amended (ADAAA) of 2008, professional disability specialists and support staff at the Disability Resource Center (DRC) facilitate a comprehensive range of academic support services and accommodations for qualified students with disabilities.

Qualified students with disabilities may be eligible to receive academic support services and accommodations. Eligibility is based on qualifying disability documentation and assessment of individual need. Students who believe they have a current and essential need for disability accommodations are responsible for requesting accommodations and providing qualifying documentation to the DRC. Every effort is made to provide reasonable accommodations for qualified students with disabilities.

Qualified students who wish to request an accommodation for a disability should contact the DRC by going to https://eoss.asu.edu/drc, calling (480) 965-1234 or emailing DRC@asu.edu. To speak with a specific office, please use the following information:

ASU Online and Downtown Phoenix Campus University Center Building, Suite 160 602-496-4321 (Voice)	**Polytechnic Campus** 480-727-1165 (Voice)
West Campus University Center Building (UCB), Room 130 602-543-8145 (Voice)	**Tempe Campus** 480-965-1234 (Voice)

Title IX

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.