

# ASTR 101

## The Sun and its Planets

Spring 2019

TuTh 11:30AM-12:45PM

Nord 410

Instructor:

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**Website:** <http://astroweb.case.edu/ssm/astr101/>

The syllabus, all assignments, homework, etc. are posted on the course website. Check frequently for updates and schedule changes.

**Textbook:** *Cosmic Perspective - Solar System* (8th edition)

by Bennett, Donahue, Schneider, & Voit.

*It shouldn't matter whether you use the electronic version or a hardcopy, but be sure to take the homework questions from the correct edition of the text.*

### Course Description

An overview of the solar system; the planets and other objects that orbit about the Sun and the Sun itself as the dominant mass and the most important source of energy in the solar system. Concepts and the development of our knowledge will be emphasized. Not available for credit to astronomy majors.

### Learning Outcomes

After taking this course, students should be able to

- Relate observations of the night sky: rising and setting motions, lunar phases, stars and planets
- Describe Earth's motion in space and how it affects the sky we see
- Explain the reasons for seasons, lunar phases, and eclipses
- Outline the Ptolemaic and Copernican cosmologies
- Describe the roles of Copernicus, Brahe, Kepler, and Galileo in the Scientific Revolution
- Describe and apply Newton's Laws of Motion and Universal Gravity
- Explain the nature of electromagnetic radiation
- Describe thermal radiation and Kirchoff's Laws
- Summarize properties of telescopes and their instrumentation
- Discuss solar system formation and structure
- Describe properties of planets, their moons, dwarf planets, comets, and asteroids
- Explain the techniques for detection of exoplanets

- Discuss the general properties of known exoplanets
- Distinguish the basic traits of legitimate science, and the methods of scientific reasoning
- Paraphrase conceptual ideas through written and verbal work (homework, exams, and papers)

## ASTR 101 LECTURE SCHEDULE

Links to lecture slides are provided after each lecture.

For an approximate preview, see this link to [slides from a previous semester](#).

<b>Date</b>	<b>Lecture Topic</b>	<b>Reading</b>	<b>Work Due</b>
Jan. 15	<a href="#">Introduction; Cosmic Scale</a>	Chapter 1	
Jan. 17	<a href="#">Scientific Method</a>	Chapter 3	
Jan. 22	<a href="#">Seasons and the Appearance of the Sky</a>	Chapter 2	
Jan. 24	<a href="#">Lunar Phases &amp; Eclipses</a>	Chapter 2	
Jan. 29	<a href="#">Competing Cosmologies</a>	Chapter 3	HW#1 DUE
Jan. 31	<a href="#">Kepler's Laws</a>	Chapter 3	
Feb. 5	<a href="#">Gravity &amp; the Laws of Motion</a>	Chapter 4	
Feb. 7	<a href="#">Tides</a>	Chapter 4	
Feb. 12	<a href="#">Electromagnetic Radiation</a>	Chapter 5	HW#2 DUE
Feb. 14	<a href="#">Exam I Review</a>	Chapters 1-4	
Feb. 19	<b>EXAM I</b>	Chapters 1-4	Exam Day
Feb. 21	<a href="#">Kirchhoff's Laws</a>	Chapter 5, 6	
Feb. 26	<a href="#">Solar System Contents</a>	Chapter 7	
Feb. 28	<a href="#">Solar System Formation</a>	Chapter 8	HW#3 DUE
Mar. 5	<a href="#">Terrestrial Planets: General</a>	Chapter 9	
Mar. 7	<a href="#">Terrestrial Planets: Individual</a>	Chapter 9	
Mar. 12	SPRING BREAK	————	
Mar. 14	SPRING BREAK	————	
Mar. 19	<a href="#">Terrestrial Planets: Atmospheres</a>	Chapter 10	
Mar. 21	<a href="#">Terrestrial Planets: Climate</a>	Chapter 10	HW#4 DUE
Mar. 26	<a href="#">Exam II Review</a>	Chapters 5-10	
Mar. 28	<b>EXAM II</b>	Chapters 1-10	Exam Day

Apr. 2	<a href="#">Jovian Planets</a>	Chapter 11	
Apr. 4	<a href="#">Moons of the Solar System</a>	Chapter 11	
Apr. 9	<a href="#">Asteroids &amp; Meteorites</a>	Chapter 12	HW#5 DUE
Apr. 11	<a href="#">Comets; Pluto</a>	Chapter 12	
Apr. 16	<a href="#">Exoplanets</a>	Chapter 13	
Apr. 18	<a href="#">The Sun</a>	Chapter 14	
Apr. 23	<a href="#">Drake's Equation</a>	Chapter 24	HW#6 DUE
Apr. 25	<a href="#">Final Review</a>	Chapters 1 - 14	
May 2	<b>FINAL EXAM</b> (Noon-3:00pm)	Chapters 1 - 14	Exam Day

## ASTR 101 The Sun and its Planets Fall 2019

### Grading

Grades are based on a point scale with different assignments weighted as shown in the table. The points are distributed across a variety of exercises so that no single thing will dominate your grade. However, this also means that it is imperative that you complete all assignments. We will drop the lowest homework, but zeros on multiple homeworks fail to add up in a big way.

ASSIGNMENT	Homeworks	Exam I	Exam II	Final	Total
POINTS	150	100	100	150	500

Letter grades will be assigned based upon your cumulative score. Here is how your grade will be determined from your point total in the class:

Letter Grade	Course Total	Percentage
A	450-500	90%-100%
B	400-449	80%-89%
C	350-399	70%-79%
D	275-349	55%-69%
F	0-274	0%-54%

The point scale makes it possible for everyone in the class to do well. For example, if everyone scores above 90% in the course, you would all receive A's. On the other hand, if no one does this well, I may adjust the number of points required to get a given grade. Any adjustment will make it easier to get a given grade, never more difficult (i.e., any curve that is applied can only benefit your grade).

# ASTR 101 Assignments

## Homeworks

Assignment	Points	Due Date
<a href="#">Homework #1</a>	30	Tuesday, Jan. 29
<a href="#">Homework #2</a>	30	Tuesday, Feb. 12
<a href="#">Homework #3</a>	30	Thursday, Feb. 28
<a href="#">Homework #4</a>	30	Thursday, Mar. 21
<a href="#">Homework #5</a>	30	Tuesday, Apr. 9
<a href="#">Homework #6</a>	30	Tuesday, Apr. 23

There are 6 homeworks with 6 problems worth 5 points each, plus one extra credit problem worth 2 points for each homework assignment. We will drop your lowest homework score so that your grade will be based on the best 5 out of 6 homework assignments. *There will be no make-ups. Neither will there be extra credit, except for the occasional in-class exercise.*

All homeworks are due at the *beginning* of lecture on the date specified. Homeworks are late (and suffer a 5 point penalty) after lecture begins. The end of lecture is the last opportunity to turn in homeworks with a 5 point late penalty. After that, homeworks will no longer be accepted.

Always put your name on your homework. Be sure to type or write neatly - we can not give credit for things we can not read. The point is to demonstrate understanding. Don't just say "42." *Succinctly* explain *why* your answer is correct.

## Exams

Exam	Points	Date	Time	Place
Exam I	100	Tuesday, Feb. 19	11:30am-12:45pm	Nord 410
Exam II	100	Thursday, Mar. 28	11:30am-12:45pm	Nord 410
Final Exam	150	Thursday, May 2	12:00-3:00pm	Nord 410

## Midterm Exams

There will be two in-class examinations during the semester as noted above. These exams are closed book with no notes, calculators, cell phones, ipods, or implants allowed. Each exam will consist of multiple choice questions, essay questions, and problem solving. Just your brain and the writing instrument of your choice. If for whatever reason, the University is *officially* closed on the exam date, the exam shifts to the next lecture date.

## Final Exam

The final exam is cumulative; it will cover *all* material discussed in this course. Some extra emphasis will be given to material covered after the second midterm. The final will include multiple choice, essay, and problem solving questions, greatly resembling a longer version of the midterms.

*Note the date of the final exam. Do not make plans to leave campus before the final!*

Finals are scheduled university-wide and are difficult to rearrange. Conflicts are beyond the purview of the instructor to remedy. If you have a conflict with the scheduled Final exam, contact the [Office of Undergraduate Studies](#).

## Missed Exams

The first rule of missing exams is:

**DON'T**

If you are not able to take an exam due to illness or some other legitimate reason and you wish to take a make-up exam, you **must**

1. contact me (by voice or e-mail) **before** you miss the regularly-scheduled exam and
2. document a valid excuse for your absence.

Make-up exams must be taken promptly.

# ASTR 101 HOMEWORK ASSIGNMENTS

Homework problems are assigned from the **8th edition** of the textbook *The Cosmic Perspective - The Solar System*.

*Be sure you are doing the right homework problems!* Other editions of the text will have different questions.

There are 6 homeworks with 6 problems worth 5 points each, plus one extra credit problem worth 2 points for each homework assignment. There are no make-ups, for illness or otherwise, but we will drop the lowest homework.

All homeworks are due in class at the *beginning* of lecture on the date specified. Homeworks are late (and suffer a 5 point penalty) after lecture begins. The end of lecture is the last opportunity to turn in homeworks with a 5 point late penalty. After that, homeworks will no longer be accepted.

Remember to put your name on your homework! Be sure to type or write neatly - we can not give credit for things we can not read.

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## **Homework #1 (30 Points) Due Tuesday Jan. 29**

Chapter 1

1. *Does It Make Sense?* **1-13, 14, 16, 17, 18**
2. **1-42** *Spacecraft Communications*
3. **1-46** *Driving Trips*

Chapter 2

4. *Does It Make Sense?* **2-17, 19, 22, 24, 26**
5. **2-40** *New Planet*
6. **2-53** *Sun's Diameter*

Extra credit

7. **2-55** *Eclipse Conditions*
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## **Homework #2 (30 Points) Due Tuesday Feb. 12**

Chapter 3

1. **3-44** *Chinese calendar*
2. **3-45** *Method of Eratosthenes I*
3. **3-48** *Eris Orbit*

Chapter 4

4. *Does It Make Sense?* **4-16, 17, 18, 19, 24**
5. **4-52** *Understanding Newton's Version of Kepler's Third Law*
6. **4-55** *Weights on Other Worlds*

Extra credit

7. **3-50** *Halley Orbit*
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## **Homework #3 (30 Points) Due Thursday Feb. 28**

Chapter 5

1. *Does It Make Sense?* **5-17, 18, 20, 21, 23**
2. **5-47** *Human Wattage*
3. **5-54** *Hotter Sun*
4. **5-56** *Doppler Calculations*

Chapter 6

5. *Does It Make Sense?* **6-13, 14, 15, 19, 20**
6. **6-42** *Light Collecting Area*

Extra credit

7. **6-44** *Finding Planets*
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## Homework #4 (30 Points) Due Thursday Mar. 21

Chapter 7

1. *Does It Make Sense?* 7-13, 15, 16, 19, 20
2. 7-39 *Size Comparisons*

Chapter 8

3. 8-45 *Radiometric Dating*
4. 8-50 *What are the odds?*

Chapter 9

5. 9-43 *Dating Planetary Surfaces*
6. 9-57 *More Plate Tectonics*

Extra credit

7. 7-44 *Mission to Pluto*
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## Homework #5 (30 Points) Due Tuesday Apr. 9

Chapter 10

1. *Does It Make Sense?* 10-23, 24, 28, 29, 32
2. 10-57 *The Mass of an Atmosphere*
3. 10-58 *The Role of Reflectivity*

Chapter 11

4. 11-49 *Disappearing Moon*
5. 11-52 *Orbital Resonances*
6. 11-53 *Titanic Titan*

Extra credit

7. 10-61 *Escape from Venus*
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## Homework #6 (30 Points) Due Tuesday Apr. 23

Chapter 12

1. 12-45 *Adding Up Asteroids*
2. 12-46 *Impact Energies*

Chapter 13

3. *Does It Make Sense?* 13-18, 19, 22, 23, 27
4. 13-50 *Planet Around 51 Pegasi*
5. 13-52 *Finding Orbit Sizes*

Chapter 14

6. *Does It Make Sense?* 14-19, 21, 23, 26, 27
7. 14-50 *Lifetime of the Sun*

Extra credit

8. 13-49 *Transit of TrES-1*
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