

ASTR 1010 Syllabus
Astronomy of the Solar System
Dr. Cassandra Hall

University of Georgia, Spring 2022

Syllabus last updated: Thu 11 Aug 2022

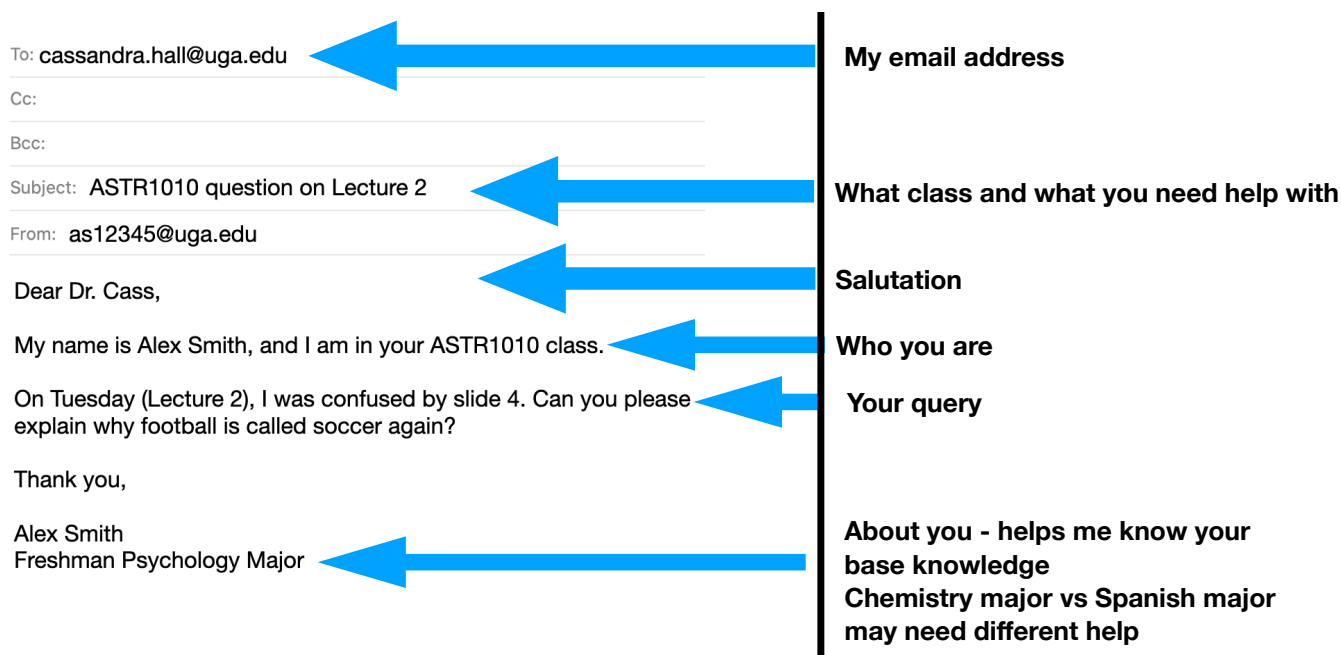
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Instructor Information

- Dr. Cassandra Hall
Assistant Professor of Computational Astrophysics
Department of Physics & Astronomy and Center for Simulational Physics
University of Georgia
- **Most students call me Dr. Cass.** You can call me Cass, Dr. Cass, Dr. Hall or Professor Hall - whatever you feel comfortable with. Please do not call me Mrs/Ms/Miss Hall, these are not prefixes I use. My pronouns are she/her.

How to contact me

- Email: cassandra.hall@uga.edu
- Here is an example email. If you need to contact me, follow this format so I can help you as quickly as possible.



TA Information

- TAs will grade most of your homework - for grading queries, please contact them.
- TA contact details: (not yet assigned as of 11 Aug 2022, syllabus will be updated when TAs are assigned.)

Class Information and office hours

Class and office hours are both in the **Physics Building**.

- **Class** : Room 202, Tuesday and Thursday: 08:00am - 09:15am.

- **Office Hours:** Room 207, Tuesday 09:15am - 10:15am, Thursday 02:50pm - 03:50 pm.

Prerequisites

Astronomy is a physical science. We will discuss elements of **mathematics, physics, and chemistry** in this course, and you will need to understand some challenging concepts such as conservation of mass and energy. Although maths is kept to a minimum, you will need to be able to do the following four things, which were taught in middle school and high school:

- **Rearranging equations:** <https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq/alg-old-school-equations/v/solving-for-a-variable>
- **Scientific notation:** <https://www.khanacademy.org/math/in-in-class-7th-math-cbse/x939d838e80cf9307:exponents-and-powers/x939d838e80cf9307:large-numbers-in-standard-form/v/scientific-notation-old>
- **Basic trigonometry:**
 - <https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles#trig-solve-for-a-side>
 - <https://www.khanacademy.org/math/trigonometry/trigonometry-right-triangles#trig-solve-for-an-angle>
- **Logarithms:** <https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:logs/x2ec2f6f830c9fb89:log-intro/v/logarithms>

How to succeed in this course

For any college-level course, you should study a minimum of 3 hours per 1 hour of class per week. For ASTR1010, that means studying 7.5 hours a week in addition to the mandatory, assessed homeworks.

Focus on understanding concepts and how to do things. In this course, **I will ask you to apply the knowledge you gain in class to questions/problems you have never seen before.** Don't panic! You have all the information you need to do that when it happens.

Ask questions.

Engage in class - answer questions, discuss with your group, etc. If you are participating virtually because of COVID, you can still ask questions.

Study technique for this course

About 75% of this class tends to be Freshman, and about 90% of the class is a non-science major. **In general, to succeed in a STEM subject at college, you must do as many practice questions as possible.** Reading the slides and textbook alone is not enough, since this is generally passive. **You need to test and challenge your conceptual understanding to actively learn.**

Effectively studying for science, engineering and mathematics based courses may be different to what you are use to. In subjects such as English, reading assigned texts may form the bulk of a successful study guide (I do not know for sure, don't quote me!).

1. Read through the lecture slides (20% of your study time)
2. Read through the textbook (20% of your study time)
- 3. Practice questions (60% of your study time)**

The screenshot displays the eLearning Commons interface for the course ASTR1010 Astronomy of the Solar System Fall 2021. The sidebar on the left contains navigation links with counts: Syllabus (1), Group numbers (1), Lecture materials (35), Homeworks (15), August 12 - January 3, Refreshers (3), Homework 1 (6), Homework 2 (6), Learn by doing quizzes (36), and Chapter quizzes (64). The main content area shows a list of resources: Maths refresher 2 (1), Maths refresher 1 (1), and Scientific notation refresher (1). Below this is a section for Homework 1, which includes a link to Practice for homework 1 (6) and a description: 'Use all of the material here to practice for homework 1, the practice maths questions, end of chapter quizzes, videos etc.' A blue arrow points to the 'Practice for homework 1' link. The bottom section is titled 'Chapter quizzes' and includes a progress bar showing 1.54% completion (1 of 65 topics complete). It lists two chapters: CHAPTER 1. THINKING LIKE AN ASTRONOMER and CHAPTER 2. PATTERNS IN THE SKY—MOTIONS OF THE EARTH AND THE MOON. Under CHAPTER 1, there are links for CH 01 FLASHCARDS and CH 01 TEST YOUR UNDERSTANDING QUIZ. A blue arrow points to the 'CH 01 TEST YOUR UNDERSTANDING QUIZ' link.

Course Objectives

- 1) Provide a basic knowledge of our Solar System. To do this, we need to put our Solar System into context, so we will also learn about other Solar Systems, and where we fit in on a galactic scale.

- 2) Understand the basics of the four fundamental forces of nature (gravity, electromagnetism, strong nuclear and weak nuclear force).
- 3) Learn to think like a scientist.

AT THE END OF THE COURSE, YOU WILL BE ABLE TO EXPLAIN THE FOLLOWING:

1. Distance scales - where the Earth fits compared to all the structure in the Universe.
2. The impact that the Earth's motion has on where the stars, the solar system planets and the Sun appear in the sky, and why we have seasons.
3. What the force of gravity does, how it acts, and Newton's and Kepler's laws.
4. How light from objects in the Universe such as stars and galaxies can tell us what objects are made up of and how they move.
5. How telescopes work, the different kinds, and the main parts of telescope.
6. How stars and planets form.
7. How the solar system planets are all different, but have some similarities.
8. What the atmospheric composition is of all the solar system planets, how they are different, and why they are different.
9. Why the Sun shines, and why it will not shine forever.
10. How we know the interior structure of the Earth.
11. What tectonic plates are, and how this is related to the magnetic field of the Earth.
12. How we search for planets around other stars.
13. What the planets around other stars are like.
14. Whether or not you think we are alone in the Universe, based on material in this course.

Course materials and textbook

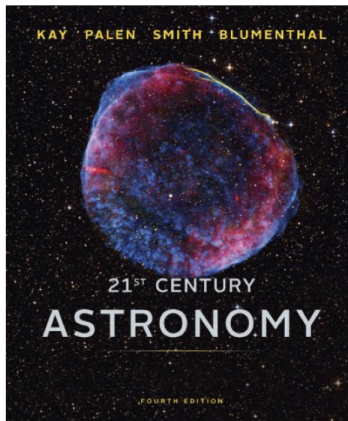
- Scientific calculator (must have square root function, powers, logs, etc)

•Course textbook:

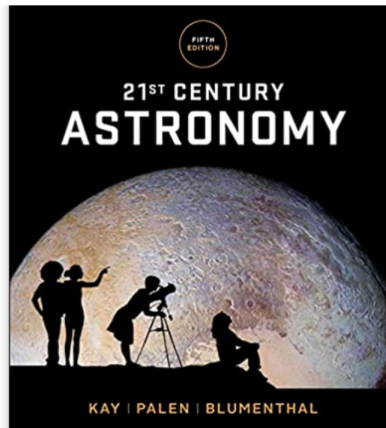
•21st Century Astronomy: The Solar System, 4th edition [Kay, Palen, Smith, Blumenthal, 2013, ISBN 10: 0393918785 /ISBN 13: 9780393918786].

•Available used from places such as abebooks.com for around \$5-\$20. **You are welcome to use e-text versions of the 4th, 5th or 6th editions that exist on the internet.** You are also welcome to use 5th and 6th print editions. I have not chosen to use these since they are much more expensive. You can use them if you want, they cover the same material, but the page numbers will not match to what we use.

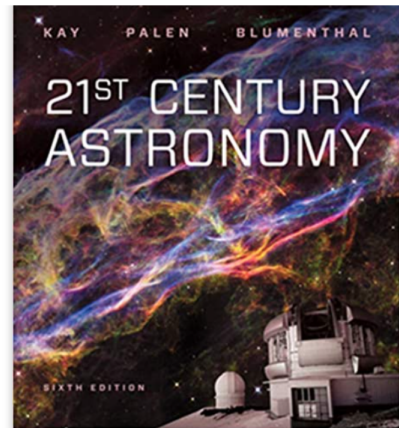
4th Ed. (I use)



5th Ed. (Fine)



6th Ed. (Fine)



Assessment

You will be assessed on both lecture and textbook content. The textbook sometimes covers material that we don't have time for in class, so it's very important you do the suggested readings, and ask questions if something doesn't make sense.

Assessment for the Fall 2022 term is as follows:

- **Nine homeworks, each worth 6% of your final grade. Work in groups of five or less.** If you don't have a group by the second week of term, let the TAs know and they can help you find one. Do not work together in larger groups - it is ineffective for your learning. You cannot work in larger groups, copying without working it out yourself is not allowed, and collaboration outside of your group is also not permitted. Any of this is a violation of UGA's academic honesty policy, and is reported to the honesty office. My policy is that everything is reported first time, no second chances.
- Each homework is done through the eLC <https://uga.view.usg.edu/d2l/login>
- Each homework focuses on the preceding 3-4 lectures, but can (and does) ask you about anything covered in the course so far.
- **Midterm (23%)** : 5 pages of notes (10 sides) allowed.
- **Final (23%)**: 5 pages of notes (10 sides) allowed.

Extra Credit

There is one way to earn extra credit in this course:

- Extra credit will be earned by participating in in-class activities, so you are strongly encouraged to attend class.

Grade scale

- A is for a score of 90.00 or above,
- A- is for the range 87.00 – 89.99,
- B+ is for 84.00 – 86.99,
- B is for 80.00 – 83.99,
- B- is for 77.00 – 79.99,
- C+ is for 74.00 – 76.99,
- C is for 70.00 – 73.99,
- C- is for 60.00 – 69.99,
- D is for 50.00 – 59.99,
- and F is for any average below 50.00.

Late policy and extensions

Fairness and honesty are very important to me. Extensions are generally not granted, and late work receives a zero. Extensions are granted if there is *documented evidence of a genuine reason beyond your control as to why work is late*. This is to be fair to everyone else who did get work in on time. Examples of accepted evidence included a doctor's sick note, a police report, a positive COVID test e.t.c. Fabricating a reason for requesting an extension is very bad form, is often found out (I do follow up on evidence!) and a direct violation of UGA's academic honesty policy. All instances are reported to UGA's academic honesty office, and you only get one warning before it leaves a permanent mark on your transcript. So, please don't do this.

If you have a genuine reason for requesting an extension, I will of course work with you and do my best to help you, I care very deeply about your success in my class and am happy to try and work out alternative arrangements where possible.

Attendance policy

None. Whether you attend class or not, it is your responsibility to find out what you missed using the ELC, the syllabus, and speaking to classmates.

Lecture materials

All materials are on the ELC.

Additional resources

The ELC contains over 100 extra resources for ASTR1010. They are broken into "Chapter quizzes" and "Learn by doing", and you will find them in the "content" part of the course. These are intended for self-directed study - please use them regularly and pick topics that are relevant or that you are struggling with.

As you will note from the syllabus, each lecture we focus on one chapter. It is good practice at the end of the lecture to go through the chapter quizzes and see if you are able to answer the questions.

The ELC will tell you what you got wrong, and you can keep going until you get them all right.

If appropriate, there will be additional maths practice for each homework as well. These will be called “Practice homeworks”, and will be short. For practice of conceptual questions for each assessed homework, please refer to “Chapter quizzes” and pick the relevant chapters for the homework.

COVID-19

Don't come to class if you are sick. I don't take attendance, so rest up until you feel better and use the ELC to get the class notes.

Equality, diversity and inclusivity statement

Everyone has the right to an inclusive, collegial, and encouraging work and study environment regardless of their race, sex, social status, gender identity, sexual orientation, age, religion or disability status. Any instances of discrimination, bullying or sexual harassment will be treated in the strongest possible terms, including seeking prosecution where appropriate. Please let me know your preferred pronouns. If you tell me and I get it wrong, call me out on it. Mine are she/her.

Science is supposed to be objective. In an ideal world, it would be. However, most of scientific history has been written by the voice of the privileged. For centuries, women were barred from higher education institutes. Black people were denied education at all. LGBT+ people faced persecution and would lose their job if their orientation became known. Indigenous Americans were forcibly removed from their land. As such, much of scientific history is white washed, straight washed, and mostly written by men. Therefore, both covert and overt biases may exist, despite the intended scientific objectivity of course material. I encourage students to let me know how either my behaviour or this course may be improved in light of this information. We all have a responsibility to be better, and to do better.

Land acknowledgement

I acknowledge that we are on the traditional territory and homelands of the following Indigenous American peoples:

- Tsalaguwetiyi (Cherokee, East)
- S'atsoyaha (Yuchi)
- Mvskoke (Muscogee / Creek)

This land was not given freely. It remains unceded. I acknowledge that lives, languages, traditions, religions and history were lost through acts of coercion and genocide by settlers. I stand in solidarity with protectors of the land, and those who advocate for access to healthcare, land rights, and education for indigenous Americans.

Course schedule (NB subject to change during course)

The course schedule will be altered if at any point the instructor deems it beneficial to your learning. Note that lecture slides contain information that is not present in the textbook, and you will be examined on both *textbook and lecture content*.

Items with a question mark(?) are approximate dates or have not been finalised yet. **All topics subject to change**, attend the lecture to be sure of the material.

Date	Lecture	Chapter	Topic	HW?
Thu 18 Aug 2022	1	Ch.1	Why learn astronomy? Intro to distance.	HW0 available. Due 30 Aug 2022
Tue 23 Aug 2022	2	Ch. 2	The motion of the Earth	
Thu 25 Aug 2022	3	Ch. 2	The motion of the Earth	HW1 available. Due 01 Sep 2022
Tue 30 Aug 2022	4	Ch. 3	The motion of astrophysical objects	HW0 due.
Thu 01 Sep 2022	5	Ch. 3	The motion of astrophysical objects	HW1 due.
Tue 06 Sep 2022	6	Ch. 4	Gravity and astrophysical orbits	
Thu 08 Sep 2022	7	Ch. 4	Gravity and astrophysical orbits	HW2 available. Due 15 Sep 2022.
Tue 13 Sep 2022	8	Ch. 5	The electromagnetic spectrum	
Thu 15 Sep 2022	9	Ch. 5	The electromagnetic spectrum	HW2 due.
Tue 20 Sep 2022	10	Ch. 6	Astronomical tools	
Thu 22 Sep 2022	11	Ch. 6	Astronomical tools	HW3 available. Due 29 Sep 2022.
Tue 27 Sep 2022	12	Ch. 7	Formation of planet systems	
Thu 29 Sep 2022	13	Ch. 7	Formation of planet systems	HW3 due.
Tue 04 Oct 2022	14	Ch. 8	Terrestrial planets and the moon	
Thu 06 Oct 2022	15	Ch. 8	Terrestrial planets and the moon	HW4 available. Due 13 Oct 2022.
Tue 11 Oct 2022			Midterm exam. 8am - 9am Physics Room 202	
Thu 13 Oct 2022	16	Ch. 9	Terrestrial planets atmosphere	HW4 due.
Tue 18 Oct 2022	17	Ch. 9	Terrestrial planets atmosphere	
Thu 20 Oct 2022	18	Ch. 10	Giant planets	
Tue 25 Oct 2022	19	Ch. 10	Giant planets	HW5 available. Due 01 Nov 2022
Thu 27 Oct 2022	20	Ch. 11	Moons and rings	
Tue 01 Nov 2022	21	Ch. 11	Moons and rings	HW5 due.
Thu 03 Nov 2022	22	Ch. 12	Dwarf planets	

Tue 08 Nov 2022	23	Ch. 12	Dwarf planets	HW6 available. Due 15 Nov 2022
Thu 10 Nov 2022	24	Ch. 14	Our star	
Tue 15 Nov 2022	25	Ch. 14	Our star	HW6 due.
Thu 17 Nov 2022	26	NA	Exoplanets and their detection	
Tue 22 Nov 2022	27	NA	Exoplanets and their detection	HW7 available. Due 01 Dec 2022
Thu 24 Nov 2022			NO CLASS - THANKSGIVING	
Tue 29 Nov 2022	28	Ch. 24	Life in the universe	
Thu 01 Dec 2022	29	Ch 24	Life in the universe	HW8 available. Due Thu 8 Dec 2022
Tue 06 Dec 2022	30	NA	Is anyone out there?	
Thu 08 Dec 2022			NO CLASS	HW8 due.
Tue 13 Dec 2022			FINAL EXAM. 8am-11am Physics Room 202	