



# ASTR 100: Understanding the Universe

## Spring 2025 Syllabus

### ***Meet the Team!***

Class email:

[Astr100unc@gmail.com](mailto:Astr100unc@gmail.com)

Office hours // help sessions:

Monday 9:00-10:00am (Ph 237)

Tuesday 1:30-2:30pm (Ph 242)

Thursday 10:00-11:00am (Ph 237)

Friday 12:00-1:00pm (Ph 237)



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Instructor



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Graduate TA/LA



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## Key Information

Credit Hours: 3



Classroom:  
Hamilton 100



Class Meeting Times:  
MWF 1:25-2:15 pm



Course Website:  
[canvas.unc.edu](https://canvas.unc.edu)

## FAQs

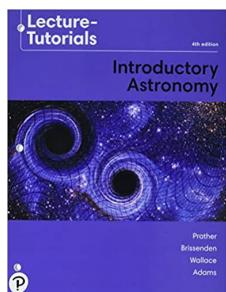
### 01 | What am I going to learn?

Learn how astronomers study and understand the cosmos. Topics include motions of the Sun, Moon, and planets; planetary surfaces, interiors, and atmospheres; telescopes and spectroscopy; prospects for detecting and visiting life elsewhere; how stars are born, age, and die; black holes, dark matter, and gravitational radiation; the Milky Way Galaxy and galaxies beyond; the birth and fate of the expanding Universe. **Target audience:** This is a general education class appropriate for any student at any stage in their undergraduate studies.

### 02 | What do I need to buy?

We know college can be expensive, so we are only asking you to buy two things:

- **Lecture-Tutorials for Introductory Astronomy (4<sup>th</sup> ed.) by Prather, Brissenden, Wallace, and Adams**



This is the workbook we will be using almost every day in class, starting on January 13, the Friday of the first week of class, so make sure you have a copy by then. It **does need to be the 4th edition**, since earlier editions don't have all the activities we will do. **If you buy a used copy, make sure it doesn't have any writing in it.** It will do you no good to buy a workbook full of someone else's (possibly wrong!) answers.

- ExpertTA homework system (<https://theexpertta.com/>)



This is our online homework system. You will automatically register for this course's ExpertTA site the first time you access a homework assignment from Canvas. Your **first 14 days of ExpertTA are free**, so if you are still waiting for some financial aid to come in, wait to access the first homework assignment so you can extend your 14-day grace period into the first couple weeks of the semester.

## 03 | Do I need anything else?

We will be using several **FREE** resources this semester:

- Poll Everywhere



Poll Everywhere lets you respond to questions I ask in class using your phone, laptop, or tablet. If you've never used Poll Everywhere before, you will need to **set up a free student account** at <https://edtech.unc.edu/service/poll-everywhere>. **You must register using your official UNC e-mail**. If you register under a different e-mail, then you will not receive credit for your responses. Please also **use both your first and last names** when you set up your account!

**At the beginning of each class, you must sign in to Poll Everywhere ([pollev.com](http://pollev.com))** on the device you will use to respond to questions. You can then join the ASTR 100 session for the day from the link/QR code we provide.

- OpenStax Astronomy textbook  
(<https://openstax.org/details/books/astronomy-2e>)



This is a free college-level astronomy textbook. You are expected to read sections of this book the day before each class (and complete the associate warm-up assignment). Occasionally, the required reading will come from a source other than this textbook. We will specify when this occurs and provide links to these other sources (all for free). Please see the course schedule for a complete list of daily readings.

- Gradescope ([www.gradescope.com](http://www.gradescope.com))



After each *Lecture-Tutorial*, we will ask you to go to the Gradescope site for our class and give your answer to one of the questions (that we specify) in the *Lecture-Tutorial*. You'll have 2 days to submit this. This gives us a quick check on your understanding. You will also submit to Gradescope your answers to pre-class "warm-up" assignments based on the assigned readings. Finally, you will also be able to access your graded exams on Gradescope. You do not need to pay for Gradescope and you can access it from Canvas.

- Calculator



Okay, this isn't free, but you probably have one from high school or another college course. We will do a little bit of math in this class, and you will want one for exams. When you are working on the homework, you can use any calculator you like - even an online calculator. **During exams, you can use any scientific or graphing calculator if it cannot connect to the internet or be used to communicate with other people (no calculator apps on your phone).** If you don't have a calculator, see if you can borrow one just for the exam.

## 04 | Am I expected to come to class?

**Yes, attendance is required.** We'll be doing a lot of interactive questions and activities, since this is the best (and most fun!) way to learn the material. A portion of your grade will be based on your attendance and participation in class.

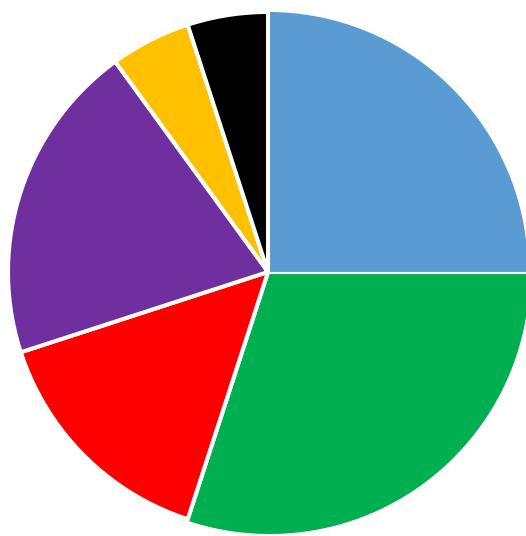
## 05 | When are the exams?

The midterm exams are scheduled for **February 3, Mar 3, and April 7**. All midterms are held in-class during our usual class meeting time. The final exam is **May 5 from 4:00-7:00 pm**.

## 06 | When are assignments due?

*Lecture-Tutorial* Checks are always due 2 days after we do a *Lecture-Tutorial* in class. Warm-up assignments are always due the night before lecture. Due dates for homework vary - see the schedule on Canvas or ExpertTA - but in general we like to have a homework assignment due about 2-3 days after we cover the material. You have until 11:59 pm on the due date to complete each assignment.

## 07 | How will you determine my grade?



- Final Exam (25%)
- Midterm Exams (30%)
- Homework (15%)
- Lecture-Tutorial Checks (20%)
- Warm-Ups (5%)
- Attendance (5%)

Each of the **3 Midterm Exams** is 10% of your final course grade. If you believe there is an error with the grading of a midterm, submit a regrade request to Gradescope within 48 after the exam is returned. We will not consider regrade requests submitted after this. The **Final Exam** will be cumulative and is 25% of your final course grade.

**Warm-ups** are graded for correctness, but don't panic if you get something wrong. They are only 5% of your final grade and their purpose is to give you a sense of what you do and do not understand so you can get more out of class.

Attendance is 5% of your final course grade and determined by participation in the Poll Everywhere questions. If your percentage on the final exam is greater than your attendance grade, the former will replace the latter.

There are **30 Homework** assignments, each with 6 questions (1 point per question). Homework constitutes 15% of your final course grade.

You will work on the *Lecture-Tutorials* in an assigned group in class. Most students will be able to finish them during class, but it's okay to take a little extra time outside of class. After each *Lecture-Tutorial*, you will need to complete a **Lecture-Tutorial Check** on Gradescope. This is just reporting your answer to 1 pre-defined question from the *Lecture-Tutorial* within 2 days of when you did it in class. The *Lecture-Tutorial* Checks are 20% of your final course grade.

## 08 | What are the cutoffs for letter grades?

Percentage	Grade	Percentage	Grade	Percentage	Grade
93-100%	A	80-82.99%	B-	67-69.99%	D+
90-92.99%	A-	77-79.99%	C+	60-66.99%	D
87-89.99%	B+	73-76.99%	C	<60%	F
83-86.99%	B	70-72.99%	C-		

We do NOT round grades.

## 09 | Will you drop assignments or accept late work?

We have built some flexibility into the grading scheme to make sure your grade won't unnecessarily suffer for issues and events that are out of your control. At the end of the semester, we will drop the following:

- Your lowest 4 days of attendance credit.
- Your lowest 3 warm-ups.
- Your lowest 2 homework assignment.
- Your lowest 2 *Lecture-Tutorial* checks.

This means the first 4 classes you miss won't hurt your attendance grade. You'll still need to keep up with the content from class, including *Lecture-Tutorials*. We plan to post the slides and a recording of each lecture on Canvas, to help you catch up if you miss class and to provide another resource for your studying.

You can also submit any **homework** assignment up to **24 hours late** for **80% credit**.

**Warm-ups and *Lecture-Tutorial* checks cannot be submitted late.** Warm-ups are meant to help prepare you for class, so there is not much of a point in doing them afterwards. As for the *Lecture-Tutorials* checks, keep in mind that most of the time you should leave class with your daily *Lecture-Tutorial* already done, so in principle you should be able to submit your *Lecture-Tutorial* check that night. However, we want to give everyone a little flexibility and extra time, in case you missed class, have questions, or need to deal with unforeseen life events. That's why we're making the *Lecture-Tutorial* checks due 2 days after we do them in class; in other words, everyone is already getting an automatic extension, so everyone should be able to submit them on time.

## 10 | Will you drop more assignments?

If you have to miss class because of a reason that is excused by the University, then **you to should put in a request to the University Approved Absence** (<https://uaao.unc.edu/university-approved-absences-request/>). The University will excuse absences for religious observances, significant personal and family emergencies, long term and ongoing health issues (both mental and physical), and participation in official University events (e.g., playing with one of UNC's sports teams or music groups).

The policy on dropped assignments is meant to give everyone the flexibility they need to balance these other obligations with your work for this class. **We will therefore not drop additional assignments or make other modifications to the grading scheme unless there is a university-approved reason for doing so.** To help clarify this policy, here are some answers to additional questions that we are commonly asked.

***If I have a valid reason for missing a day of class, will you drop that day from my attendance grade in addition to the 4 days you promised to drop?***

In general, no. The 4 days of dropped attendance grades are meant to account for all sorts of absences that often occur during a semester. The exception is only for university-approved absences.

***But what if I have valid reasons for missing more than 4 classes?***

Missing a couple of classes (in addition to the 4) are unlikely to significantly impact your overall grade. The bigger issue is keeping up with the work if you miss so many classes.

At the end of the semester, we will replace your attendance grade with your percentage on the final exam if the latter is higher. If you really don't want to come to class, and you feel confident that you can do well on the final exam, then this policy will help you. Please note that (in my experience) almost all students who don't come to class on a regular basis also do not do well on the final exam.

***But what if I skip a couple classes early in the semester, thinking that they would get dropped, and then I find out later in the term that I must miss class for valid reasons?***

This is why it is not a good idea to skip class unless you need to. Save your dropped attendance days for when you need them.

***What if I'm sick?***

We all get sick from time-to-time. If this happens to you, please stay home, both for your own benefit and to prevent spreading an illness to others in the class. Most colds will cause you to only miss a class or two, which can be dropped as part our attendance policy. If it's something more severe get documentation and reach out to the approved absence office.

***What about dropping other assignments?***

The warm-ups and homework assignments are posted well in advance of their due dates, so you should be able to submit these on time, even if you are out-of-town or otherwise not able to attend a particular class. Likewise, you can see from the course schedule which *Lecture-Tutorial* we are doing on a given day, so if you miss that class, you can review the PowerPoint slides and class recording on Canvas and then work on the *Lecture-Tutorial* on your own. This will allow you to submit the *Lecture-Tutorial* check on time. If you know you have an upcoming conflict (e.g., participating in a performance or sporting event), please plan your schedule accordingly so you can submit your work on time. Of course, there might be times when you forget about an assignment or just can't do it (perhaps because you are feeling too sick), that is why we have the drop policy.

### ***When will you make adjustments to grades?***

At the end of the semester. It's easier for us to do all adjustments at once, when all the grades are in. So don't panic if you see a 0 for an assignment you know should be dropped. At the end of the semester, before we submit final course grades, we'll make sure to give you time to review our calculations of the various components of your grade, after we have accounted for all dropped assignments. If you find a potential problem, you can let us know so we can fix it before we submit final grades.

## **11 | What if I miss an exam?**

Let us know as soon as you can if this happens. If you have a university-approved absence, then we will work with you to see if we can find a time for you to take a make-up exam. It is our goal to return exams within a few days so you get prompt feedback on your progress, and we cannot give an exam after returning them to the class. The most common fix in these cases is to replace the exam in your final course grade with your percentage on the final exam.

If you miss an exam that does not meet the university-approval system, then please still reach out to us. We will not be angry. The policy above still applies (try to schedule a makeup or replace with final exam). The difference is that unexcused exam absences incur a 20% penalty.

## **12 | What if I need help?**

Come to the help sessions. They are spread over the week. We do have one request: *Please do not e-mail us with content questions; with two hundred students this term, there is no way we can keep up with the e-mail volume.* You may e-mail us with non-content questions or concerns.

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## ASTR 100L



Are you really into astronomy? Do you want to do astronomy for your lab credit? If so, consider taking ASTR 100L: Observing with Skynet - Our Place in Space. You can take it now or in a future semester.

In ASTR 100L, you'll use UNC's global network of "Skynet" telescopes to observe planets, moons, and other Solar System objects, star-forming regions and clusters, supernova remnants, and galaxies. Through these observations and others, you'll achieve a better understanding of our place in the universe, and resolve common misconceptions. Topics include: the seasons, the Galilean revolution, the cosmic distance ladder, the Great Debate of 1920, dark matter in our galaxy, Hubble's law and dark energy, and gravitational waves.

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## Policies

### 01 | Diversity Statement

We value the perspectives of individuals from all backgrounds reflecting the diversity of our students. We broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. We strive to make this classroom an inclusive space for all students. Please let us know if there is anything we can do to improve. We appreciate suggestions.

### 02 | Non-Discrimination Policy

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's [Policy Statement on Non-Discrimination](#) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, creed, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct

and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (see contact info at [safe.unc.edu](https://safe.unc.edu)) or the [Equal Opportunity and Compliance Office](#), or online to the EOC at <https://eoc.unc.edu/report-an-incident/>.

## 03 | Title IX Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/>. Please contact the University's Title IX Coordinator (Elizabeth Hall – [titleixcoordinator@unc.edu](mailto:titleixcoordinator@unc.edu)), Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu); confidential) to discuss your specific needs. Additional resources are available at [safe.unc.edu](https://safe.unc.edu).

## 04 | Counseling and Psychological Services

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/>. Please contact the University's Title IX Coordinator (Elizabeth Hall – [titleixcoordinator@unc.edu](mailto:titleixcoordinator@unc.edu)), Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu); confidential) to discuss your specific needs. Additional resources are available at [safe.unc.edu](https://safe.unc.edu).

## 05 | Accessibility Resources and Services

The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability, or pregnancy complications resulting in barriers to fully accessing University courses, programs, and activities.

Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: <https://ars.unc.edu> or email [ars@unc.edu](mailto:ars@unc.edu).

## 06 | Honor Code Policy

The [Honor Code and the Campus Code](#), embodying the ideals of academic honesty, integrity, and responsible citizenship, have for over 100 years governed the performance of all academic work and student conduct at the University of North Carolina. All students are expected to follow the guidelines of the UNC Honor Code. In particular, students are expected to refrain from “lying, cheating, or stealing” in the academic context. If you are unsure about which actions violate the Honor Code, please see me or consult [studentconduct.unc.edu](http://studentconduct.unc.edu).

Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work. If you have any questions about the Honor Code, please consult with someone in the Office of the Student Conduct or the Office of the Dean of Students. Any issues that students encounter related to fairness or inappropriate conduct should be brought to the immediate attention of an instructor.

You will often collaborate with other students in this course (sharing data, results, and ideas), and you are encouraged to study together outside of class; your learning will be most effective if you think independently before comparing results. However, *any written conclusions that are submitted independently and not as a group, or any work submitted for an individual score or grade, must be in your own words and not copied from someone or somewhere else*. The specific rules for several types of assignments are given below.

### **Collaborative work and group submission**

- a. You are expected to collaborate on assignments that are explicitly designated as group submissions and will receive a group score. These include assignments done in groups.

### **Collaboration allowed; individual submission required**

- b. You are allowed to discuss homework assignments with other students, but you must enter your own answers. You may submit questions about these assignments and guidance to other students to the course forum before the due date but not answers to the problems.
- c. You may work on other assignments collaboratively but must write submissions in your own words. If you are uncertain about the degree of collaboration allowed on these other assignments, please ask an instructor for clarification.

### **No collaboration of any kind allowed**

- d. All answers you submit on all exams must be solely your own work. *Any consultation with other students or use of on-line solution sites is a serious Honor Code violation.*
- e. Instructors will actively scan on-line solution sites during the exams. Agreements with these sites allow UNC to obtain names, e-mail addresses, IP addresses, and other metadata to use in identifying and prosecuting those who use them.
- f. Distributing or using solution manuals for the textbook or the homework assignments, or any solutions for graded or scored material (e.g., from previous semesters) is forbidden and will be considered an Honor Code violation.

### **Consequences of violations**

- g. Violations of these rules will be prosecuted without exception through the Office of Student Conduct (OSC). **Submission of evidence to the OSC, regardless of guilt, will result in an immediate suspension of your grade until resolution.** This may prevent you from submitting grades as part of an application to a professional school or internship.
- h. If you are convicted of an Honor Code violation you may receive a failing grade on an assignment or the entire course.
- i. You may also be placed on probation and barred from leadership positions in campus organizations.
- j. You may experience delay in progress toward your degree, suspension, *or even expulsion from UNC*, depending on the type and severity of the offense.
- k. An Honor Code violation tarnishes your academic record and may keep you from getting into professional school or some other intended career path.
- l. Students who have been through Honor Court proceedings report that they suffered extreme anxiety throughout the Honor Court proceedings (which can take several months). They were required to complete additional educational assignments to reflect on their poor decision. They recognized that they had lost their integrity and been unfair to other students and their instructors.
- m. Students who have violated the Honor Code by cheating in a physics or astronomy course at UNC have said that *if they had known the consequences of their decision, they would not have made this mistake.*

## 07 | Learning Center

Want to get the most out of this course or others this semester? Visit UNC's Learning Center at <http://learningcenter.unc.edu> to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

## 08 | Undergraduate Testing Center

The College of Arts and Sciences provides a secure, proctored environment in which exams can be taken. The center works with instructors to proctor exams for their undergraduate students who are not registered with ARS and who do not need testing accommodations as provided by ARS. In other words, the Center provides a proctored testing environment for students who are unable to take an exam at the normally scheduled time (with pre-arrangement by your instructor). For more information, visit <http://testingcenter.web.unc.edu/>.

## 09 | Attendance Policy

**University Policy:** As stated in the University's [Class Attendance Policy](#), no right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences:

- a. Authorized University activities
- b. Disability/religious observance/pregnancy, as required by law and approved by [Accessibility Resources and Service](#) and/or the [Equal Opportunity and Compliance Office \(EOC\)](#)
- c. Significant health condition and/or personal/family emergency as approved by the [Office of the Dean of Students](#), [Gender Violence Service Coordinators](#), and/or the [Equal Opportunity and Compliance Office \(EOC\)](#).

**Class Policy:** Instructors may work with students to meet attendance needs that do not fall within University approved absences. For situations when an absence is not University approved (e.g., a job interview or club activity), instructors determine their own approach to missed classes and make-up assessment and assignments.

**University Approved Absence Office (UAAO):** The [UAAO](#) website provides information and FAQs for students and faculty related to University Approved Absences.

## 10 | Acceptable Use Policy

By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. In the context of a class, it's quite likely you will participate in online activities that could include personal information about you or your peers, and the AUP addresses your obligations to protect the privacy of class participants. In addition, the AUP addresses matters of others' intellectual property, including copyright. These are only a couple of typical examples, so you should consult the full [Information Technology Acceptable Use Policy](#), which covers topics related to using digital resources, such as privacy, confidentiality, and intellectual property.

Additionally, consult the University website "[Safe Computing at UNC](#)" for information about the data security policies, updates, and tips on keeping your identity, information, and devices safe.

## 11 | Grade Appeal Process

If you feel you have been awarded an incorrect grade, please discuss with us. If we cannot resolve the issue, you may talk to our departmental director of undergraduate studies or appeal the grade through a formal university process based on arithmetic/clerical error, arbitrariness, discrimination, harassment, or personal malice. To learn more, go to the [Academic Advising Program](#) website.

## 12 | Guidelines for Generative AI

As a policy, using Generative AI is not allowed for any assignment or exam. You will not have access to the internet on your exam.

Homework and warm-ups are designed to help you learn and improve your performance on the Exams. Generative AI tends to give similar or identical answers to all users. Unsurprisingly, students who give answers eerily similar to Generative AI in homework tend to do poorly on the exams. Since the exams are a much larger fraction of your final grade, I suggest treating homework and warm-ups as exam practice, rather than a specific assessment.

I have run all the assignments through the most popular AI tools, and while they give reasonable answers to many questions, they still often embarrassingly wrong. **You are 100% responsible for your final product.**

## 13 | Syllabus Changes

The professors reserve the right to make changes to the syllabus including assignment due dates and test dates. These changes will be announced as early as possible.

The most common changes are to the schedule due to unforeseen sickness or obligation from the instructional team. In these cases, I will provide an updated schedule as soon as possible, but you should assume the schedule stands until otherwise noted.

### ***Capacities***

## 01 | Natural Scientific Investigation

Students learn how to make and interpret scientific descriptions and explanations of the natural world, practice the skills of scientific inquiry, and evaluate scientific evidence within the contexts of both scientific communities and society.

### **Questions for Students**

1. What rules govern the natural world and how are they discovered, tested, and validated?
2. What is distinctive about the approach to understanding employed in the natural sciences?
3. What challenges are encountered in making measurements of the natural world?
4. What are the limits of investigation in the natural sciences?

### **Learning Outcomes**

1. Demonstrate the ability to use scientific knowledge, logic, and imagination to construct and justify scientific claims about naturally occurring phenomena, including validation through rigorous empirical testing.
2. Analyze and apply processes of natural scientific inquiry as dictated by the phenomena and questions at hand. These include generating and testing hypotheses or theories pertaining to the natural world; using logic and creativity to design investigations to test these hypotheses; collecting and interpreting data about the

natural world; making inferences that respect measurement error; building and justifying arguments and explanations; communicating and defending conclusions; revising arguments and conclusions based on new evidence and/or feedback from peers; and synthesizing new knowledge into broader scientific understanding.

3. Evaluate science-related claims and information from popular and/or peer-reviewed sources by examining the relationship between the evidence, arguments, and conclusions presented and by assessing consistency with existing knowledge from valid and reliable scientific sources.
4. Identify, assess, and make informed decisions about ethical issues at the intersections of the natural sciences and society.

## 02 Quantitative Reasoning

Students learn to comprehend and apply mathematical concepts in authentic contexts, developing tools for reasoning with data, logic, and quantitative methods.

### Questions for Students

1. What is the role of mathematics in organizing and interpreting measurements of the world?
2. How can mathematical models and quantitative analysis be used to summarize or synthesize data into knowledge and predictions?
3. What methodology can we apply to validate or reject mathematical models or to express our degree of confidence in them?

### Learning Outcomes

1. Summarize, interpret, and present quantitative data in mathematical forms, such as graphs, diagrams, tables, or mathematical text.
2. Develop or compute representations of data using mathematical forms or equations as models, and use statistical methods to assess their validity.
3. Make and evaluate important assumptions in the estimation, modeling, and analysis of data, and recognize the limitations of the results.
4. Apply mathematical concepts, data, procedures, and solutions to make judgments and draw conclusions.
5. Synthesize and present quantitative data to others to explain findings or to provide

quantitative evidence in support of a position.

## 03 | Recurring Capacities

All focus capacity courses are required to satisfy the same recurring capacities. In this course, you will be required to write more than 10 pages over the course of the semester. You will also work in collaborative groups and you will present, argue, and debate material in class with your peers as part of the regular in-class activities.

### ***Outcomes***

Here are the course-specific learning outcomes for ASTR 100:

- You will interpret graphs, tables of data, equations, pictures, and other representations in order to figure out information about planets, stars, galaxies, and other objects in the Universe.
- You will describe how astronomers have figured out the ages, evolution, and fates of planets, stars, galaxies, and the Universe as a whole.
- You will explain the practical applications of astronomy, such as the science behind climate change and figuring out the probability Earth will be hit by a civilization-destroying comet or asteroid within our lifetime.