You have chosen a great time to take this course. Astronomy is right now in a golden age, with an explosion of new images and data about the Solar System, the Galaxy, and indeed the whole Universe coming from many new ground-based and space-based telescopes. Our scientific view of the big picture—the nature of the physical universe—underwent a revolution in the 20th century, and further discoveries are on the horizon.

In this course, you will get an understanding of the big astronomical picture. We will survey what astronomy teaches us about the physical universe, including many of the latest discoveries, such as extrasolar planets, the search for life in the universe, black holes, and dark matter and energy; what are some of the fundamental mysteries that remain unsolved; and how the flood of new data will help to solve them. Our survey of astronomical history, ideas, and methods also gives us the opportunity to examine what science is, and how science works as a dynamic and human enterprise. No scientific or mathematical background is assumed, beyond the entrance requirements to the University. Astronomy is a science, however, so you will be expected to develop your critical thinking skills in order to understand and apply the scientific method. In terms of mathematics, we will use only arithmetic and a bit of simple algebra.

My goal is that a graduate of this course will understand our current scientific view of the universe, future discoveries and how they fit into, enlarge, or challenge our current ideas, and finally be able to make informed opinions about scientific policy. To this end, by conclusion of the course the student will:

- Understand *The Big Picture* - the basic organization of the cosmos from subatomic scales to the entire Universe
- Understand *Basic Physical Laws* - the rules that nature follows, and how to apply them to understand astronomical observations and events
- Understand *Key Discoveries* - the answers to questions such as: How does the Sun shine? How do stars form? What are black holes and what evidence for them exists? Why do we believe in dark matter and dark energy? What will be the future fate of the universe, and how can we predict this?

Astronomy is an example of a vital, active science. Our survey of astronomical history, ideas, and methods gives us the opportunity to examine what science is, and how science works as a dynamic and human enterprise. We will in particular emphasize:

- the scientific method - what it is, and how scientists breathe life into this approach
- problem solving - sometimes using a little algebra
- "critical thinking" - i.e., careful, logical, rigorous thinking about problems

This is a 3-credit hour course. This course satisfies the General Education Criteria for a Physical Sciences (Natural Sciences and Technology) course. Credit is not given to students with credit in ASTR 121, ASTR 122, or ASTR 210. The engineering college may not give credit for this course.
The course is 8 weeks long and consists of 8 content modules. Please be aware that this course is accelerated in nature; 15 weeks' worth of content will be covered in an 8-week time span. Actual time commitments will vary depending on your input, needs, and personal study habits. You are required to log on to the course website a minimum of 4 days per week but as discussions develop, you will probably need to do so more frequently.

This course is designed with the principles of collaborative learning, constructivism, and active participation in mind. You are encouraged to share your thoughts and engage in problem-solving. The course has a consistent and predictable structure, organized around the modules, with a course website that is straightforward and easy to navigate. Instructions and due dates for activities and assignments are clearly articulated so that you know what is expected of you and will be able to easily stay on track.

We realize that you have a life beyond the scope of this course. However, if you are unable to complete an assignment because of professional obligations, you should notify the instructor or, better yet, prepare the assignment ahead of time and post it early. This will give your classmates a head start in reading and responding to your work. Most assignments are due by 11:55 PM of their respective due dates as listed on the lesson overviews, giving you and your classmates time to read and comment on each other's work before the next module begins.

Note that when this course is offered during the fall or spring semester, instruction continues during Fall Break and Spring Break. Unless otherwise specified, you are still required to complete all assignments by the deadlines listed on the lesson overview page.

Readings and responses to discussion questions should be read and submitted during the module for which they are assigned in order to get the most benefit from the discussions. At the end of each content module, participants will have an opportunity to make sure that they have completed all the required activities and assignments.

How the Course Works

Astronomy 100 online is a fun course. The student has to work their way through a self-guided narrative story, just-in-time teaching, and questions. By immersing you in the story with a reason to solve the astronomical puzzles, you learn by a hands-on need for the knowledge. The basic premise is that you have been abducted by aliens. (We'll talk about the likelihood of this more in the course.) To save the Earth from enslavement or destruction, you must learn enough astronomy to face the dreaded overlords and her basic astronomy questions! (Of course, only truly intelligent civilizations teach their citizens astronomy!) Luckily you have all of last semester's lectures and animations from a friend, so you have a chance if you can only learn fast enough to keep up with the overlords' demands.

In order to keep you on the right track for completion of the course and exams, you have to finish the narrative to get full credit and to "unlock" the online observing assignments. Buckle up (I hear interstellar travel is really difficult), keep up with the class lectures and assignments, and have fun!

Format and First Steps

This is a fully on-line asynchronous course with no formal class meetings. All materials and elements of the course are available via this moodle course website.

Step 1: Look over this syllabus for a general overview of the course, including the course description and requirements.

Step 2: Become familiar with the course website by going through each of the main sections and subsections every lesson.

Step 3: No textbook purchase is required for this course; however you are expected to read the lecture notes provided each lesson.

Step 4: Read over the information provided below carefully so you can effectively navigate the course website and its component parts.

Step 5: Look at the Announcements section of the website every time you log in. It will contain all the news related to the course as well as reminders about upcoming deadlines.

Textbook
There is no required textbook for this course. To provide additional information to the lessons, lecture notes are provided. Much of the content necessary is in these lecture notes for the course or can be looked up online (see the Key Phrases for each section). You are expected to read the lecture notes and material from them can be on the homework or the exams.

Course Outline

Lesson 1: The Sky
In this lesson, we learn about what causes the seasons, the motions of the sky, the constellations, the phases of the Moon, lunar eclipses and solar eclipses.

Lesson 2: Orbits, Gravity, & Light
In this lesson, we explore the history of humankind’s search for an understanding of our Solar System through the motions of our planets. During that journey, we describe gravity and light and how they are the main players in astronomy.

Lesson 3: The Planets
In this lesson, we explore our Solar System through the planets and the clues they offer on our formation.

Lesson 4: The Sun and Stars
In this lesson, we ask the main question of “why does the sun shine?”. This leads us to explore stars and the different kinds of stars.

Lesson 5: Lives and Deaths of Stars
In this lesson, we learn about the birth of death of stars. We find that it all depends on the star’s mass.

Lesson 6: Galaxies
In this lesson, we find out what galaxies are and their different types, as well as their hidden secrets.

Lesson 7: Cosmology
In this lesson, we explore the origin of the Universe, how we know how old it is, and what its likely fate is.

Lesson 8: Astrobiology
In this lesson, we tackle one of the biggest questions of all time: Are we alone?

Course Activities

Grading Scale

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<thead>
<tr>
<th>Letter</th>
<th>Scale (%)</th>
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<tbody>
<tr>
<td>A+</td>
<td>98–100</td>
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<tr>
<td>A</td>
<td>93–97.9</td>
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<tr>
<td>A-</td>
<td>90–92.9</td>
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<td>B+</td>
<td>87–89.9</td>
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<tr>
<td>B</td>
<td>83–86.9</td>
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<tr>
<td>B-</td>
<td>80–82.9</td>
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Assignments, Weights, and Deliverables

You can access your scores by clicking the Grades (https://learn.illinois.edu/mod/url/view.php?id=1431025) link from the left column of the course home page.

All interim and final deliverables have due dates. Failure to meet deadlines results in a reduction of the assignment points. For the due dates of each assignment, please see the lesson overviews.

You are expected to complete your work independently, in accordance with University policy (http://admin.illinois.edu/policy/code/article1_part4_1-401.html). Failure to do so will result in strict disciplinary action, including loss of all credit for the assignment, notification of a dean, and possible dismissal from the University. You may work with others on homework, but the final product must be your own.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Exam 1</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
<th>Lesson 5</th>
<th>Exam 2</th>
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See Section 3-102 of the Student Code (http://admin.illinois.edu/policy/code/article3_part1_3-102.html) for more information on the Grading System.
<table>
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<tr>
<th>Classification Lab</th>
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<tbody>
<tr>
<td>Exams</td>
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<tr>
<td>Extra Credit**</td>
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<td>Total</td>
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* Narrative Stories are scored as follows: 80% for completion, 20% for correct answers.

** Extra Credit not included in weekly/course point totals.

**Lesson Overviews**

Each module will begin with the module overview, explain what the module is about, what learning goals you are expected to achieve, how long the module will take, and in what activities you will participate. Each module is designed with the same structure and activities unless otherwise specified. The module activities are explained in greater detail below. You can find the due dates of specific assignments on each lesson’s Overview page.

**Test Of Astronomy STandards (TOAST) Assessment**

At the beginning and end of the semester, you will be asked to complete a multiple choice and anonymous questionnaire that probes your understanding of astronomy. The first one is to assess your astronomy knowledge before the class, and the second one to assess your astronomy knowledge after the class. These are not graded, and in fact, I will not know how well you did on the questionnaire. You will, however, be given full credit for completing the questionnaire, which should take no more than 30 mins. To get full credit, you must answer every question, so do your best (but do not “Google” the answers, that ruins the purpose of the assessment).

**Narrative Story (Lessons)**

Each lesson will begin with the lesson overview, explain what the lesson is about, what learning goals you are expected to achieve, how long the lesson will take, and in what activities you will participate. The lessons are self‐guided narratives with story interactions. To get full participation credit, you must complete the narrative story in that module. Narrative Stories are scored as follows: 80% for completion, 20% for correct answers. **We find that the student who do the best in the course, carefully read the narratives.**

**Labs**

There are 3 online labs throughout the course, meant to strengthen your understanding of the topics and develop a feel for how modern astronomy works. You will be granted access to these labs as you complete the corresponding sections narrative stories. This is meant to make sure that you have the necessary background to successfully complete the lab. The labs are:

- **Observing the Sun’s Position and Motion**: You will make simulated observations of the Sun’s changing position in the sky over the course of the year to better understand the changes in its daily path.
- **Exploring Stellar Properties**: You will use an interactive Hertzsprung-Russell (HR) Diagram to learn about the relationship between the luminosities, temperatures, and sizes of stars. You will also consider how we study the population of stars to determine the nature of an "average star".
- **Learning from Galaxy Classification**: You will learn how to classify galaxies and apply this knowledge to real data from the Coma Cluster of galaxies. You will use your results to think about the differences in galaxy morphologies inside vs. outside of galaxy clusters.

**Homework**

Every lesson, there will be a homework assignment to gauge your understanding of the material-- both the self-guided narratives as well as the lecture notes. The homework assignments are multiple choice and can be taken up to three times with the highest grade counted.

**Misconceptions Activities**
Within small discussion groups, you will be given a set of misconceptions related to the topic of the lesson. Each person should select one of the misconceptions on a first-come, first-serve basis and post an explanation and correction of the misconception. Others should respond to the posts made by classmates so as to continue the discussion to assure that both you and your group members are correcting and not perpetuating these misconceptions. The discussion forums are a ripe place to engage with one another as you wrestle with the content covered in the lesson.

You will receive credit each week for actively participating in the forums. In the final week of the class, you will submit your "best" contributions to the forums (one initial post and one response post) for assessment.

Exams

This course will employ three non-cumulative exams. For on-campus students, these exams will be taken at arranged times and locations your instructor will tell you about as the time draws near. For off-campus students, the exams will be taken through an online proctoring service, ProctorU (http://ao.citl.illinois.edu/support/source/student_services/proctoru_tech.html) (or an approved third-party proctor). Note: on-campus students may also use the ProctorU (http://ao.citl.illinois.edu/support/source/student_services/proctoru_tech.html) service if on-campus exam times do not fit their schedules.

For the exams you are allowed one standard piece of paper (Letter or A4 sized) with notes typed, hand-written, or whatever. For additional information, please review Exam Information (https://learn.illinois.edu/mod/page/view.php?id=1431031) and Sign-Up and Proctoring Options for Exams.

Extra Credit

**Surveys:** There are two anonymous surveys, Lesson 5 Check-In (https://learn.illinois.edu/mod/questionnaire/view.php?id=1431274) and the End-of-Semester Survey. These surveys are designed to aid us in making this course better for you. Each survey is worth 5 points of extra credit (a total of 10 points for the course).

**Moon Observing:** Over the length of the course, you can observe the changing phase of the Moon. Take images with a digital camera (e.g., with your cell phone camera) of the various phases of the Moon and submit your images with the time, date, location, and observed phase of the Moon for extra credit. You can earn 5 points of extra credit for each phase you observe, and if you observe all 7 potentially visible phases, you will receive 5 bonus points.

**A note about sources of information:** It is highly recommend that you only consult the following sources of information in studying for this class. Use of another source (such as Internet sites found via Google) may provide information that is unreliable.

- Suggested books and required readings
- Supplemental information posted on course website
- Internet links provided in class or on course website

❓ Getting Help

If you need help:

- Only contact your instructor directly if you have a personal question.
- For all other questions about course content, activities, deadlines, technical problems, etc., please check the Course Q and A (https://learn.illinois.edu/mod/forum/view.php?id=1431070) forum to see if someone else has already asked your same question and received a response.
- If your question isn't there yet, post your question to the Course Q and A (https://learn.illinois.edu/mod/forum/view.php?id=1431070) forum. Feel free to help your peers out if you know the answer!
- If you have technical problems, please fill out this form (http://www.atlas.illinois.edu/support/teaching/moodle/student/).
- If you have trouble with Blackboard Collaborate (Virtual Office (https://learn.illinois.edu/mod/elluminate/view.php?id=1431424) and Study Lounge (https://learn.illinois.edu/mod/elluminate/view.php?id=1431427)), please contact Blackboard Collaborate Support (http://www.blackboard.com/Platforms/Collaborate/Support/Support-for-Blackboard-Collaborate.aspx)