

Syllabus for AST 1002 Discovering the Universe Spring 2021

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Class Periods: MWF Period 7 (1:55-2:45)
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(via zoom, link given in Canvas)

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Office Hours: Monday, 11am-12pm
(via zoom, link given in Canvas)

Online Course Information: Handouts and additional information can be found on the course Canvas page. Homework assignments will be online through the Mastering Astronomy interface in Canvas.

Required Text: The Essential Cosmic Perspective 8th edition with Mastering Astronomy (*Bennett, Donahue, Schneider, & Voit*)

The electronic version of this textbook is available through UF All-Access. If you purchase this version, it comes with access to Mastering Astronomy. There are instructions posted in Canvas

Course Content

This course offers a broad overview of modern astronomy. We will examine how observation, experimentation and exploration have led to our present day understanding of the universe we live in. Although this is essentially a non-mathematical science course, a very basic knowledge of mathematics is required. Our goal is to help you gain a physical understanding and an appreciation of the cosmos and more generally of scientific method. Along the way, we will also use and practice critical thinking skills. This course is primarily for those not majoring in physical science or mathematics.

The topics we will cover include:

- Motions of the sky
- A historical development of our understanding of the solar system: An example of the scientific method
- Light and telescopes
- The properties of planets
- The nature and lives of stars
- The nature of our Milky Way Galaxy
- Properties of other galaxies
- The origin and fate of the Universe
- The search for extraterrestrial life.

As the list of topics above demonstrates, the course covers not only the Universe and the

bodies in it -- planets, moons, stars, galaxies, etc. -- but also how we know about those things, making use of our understanding of the underlying physics of orbits and radiation.

Course Learning Objectives

- To introduce students to the basic concepts of astronomy & astrophysics, providing an overview of modern astronomy.
- To teach students the scientific process and how we can understand the universe using basic physical laws derived on Earth.
- To teach scientific reasoning and improve scientific literacy. Scientific reasoning – the use of logic, observations, and critical thinking to interpret the world around you is a skill that will serve you well in your daily lives regardless of what career you pursue. Likewise, literacy in the basic concepts and terminology of science is necessary if you wish to follow a science stories in the news or make informed decisions (such as voting) on scientific issues.
- Communicate scientific ideas clearly and effectively using oral, written or graphic forms.

Critical Dates

- February 10: 1st Exam
- March 12: 2nd Exam
- April 2: Projects Due
- April 21: Last Day of Class
- April 29: Final Exam (10:00am-12:00pm)

Class Expectations

There will be weekly reading assignments from the textbook. You are expected to read the material in advance of the lectures and be ready to actively participate in class. I will not cover all of the assigned reading during class, but will rather focus upon the topics and concepts that are most important. If you wish for clarification on sections of the reading that you find confusing, you can send me email and I will try to adjust the lectures to cover that material.

You are also expected to not engage in any activity during class that is distracting to other students or detrimental to their ability to learn. Please be courteous to your fellow classmates and turn off the ringer on your phones. Use of phones is prohibited during lectures.

Course & Grading Information

Your grade for the course will be based on the following:

In class exams – (2 exams -15% each)	30%
Comprehensive Final Exam	30%
Class Projects	20%
Homeworks, Quizzes, or small projects	20%

Grading scale: The following grading scale is guaranteed:

Letter Grade	% Points	GPA	Letter Grade	% Points	GPA	Letter Grade	% Points	GPA
A	>90	4.0	B-	77 - 79	2.67	D+	64 - 66	1.33
A-	87 - 89	3.67	C+	74 - 76	2.33	D	60 - 63	1.0
B+	84 - 86	3.33	C	70 - 73	2.0	D-	56 - 59	0.67
B	80 - 83	3.0	C-	67 - 69	1.67	E	< 55	0

- Your actual final grade will be no lower than on this scale, which may be curved based upon the overall performance of the class. Grading in this class is consistent with UF policies available at: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Assignment Values

Exams (60% of grade): The two mid-term exams will be given on September 25 and Wednesday, October 28. Each of these in-class exams will be worth 15% of your grade. The final exam, worth 30% of your grade, is scheduled for Thursday, December 14 from 7:30-9:30am in exam period 14A.

Homework : Homework will be online through the Mastering Astronomy interface on the Canvas page. The deadlines for each assignment will be clearly posted on this web page. In general assignments will be due on Mondays. Homework assignments must be submitted on time to receive full credit. For late assignments there will be a deduction of 33% per day. No homework extensions will be granted unless the extension is approved in advance of the deadline or documentation of a medical issue is provided.

Class Projects (15%): An important element of this course is the assigned hands-on class project. Normally this is an observing project at the campus teaching observatory, but this semester we will be doing something a bit different due to covid. Details will follow shortly.

Make-up Policy

Students are expected to complete all requirements by the specified due dates. If a student misses an assignment due to an excused absence as specified in the undergraduate catalog and provides the instructor with timely notification, they will be allowed a reasonable time to make up the missed work. The format of a make-up test/exam will be at the discretion of the instructor.

Extra Credit

There will be occasional extra credit problems on the homework. There will also be a few opportunities for additional extra credit during the course of the semester up to a maximum of 5% for the semester.

Relevant UF Policies

This course is aligned with the UF policies below.

- **Contact Hours:** "Contact Hours" refers to the hours per week in which students are in contact with the instructor, excluding office hours or other voluntary contact. The number of contact hours in this course equals the number of credits the course offers.
- **Workload:** As a Carnegie I, research-intensive university, UF is required by federal law to assign at least 2 hours of work outside of class for every contact hour. Work done in these hours may include reading/viewing assigned material and doing explicitly assigned individual or group work, as well as reviewing notes from class, synthesizing information in advance of exams or papers, and other self-determined study tasks.
- **Accommodation for Student with Disabilities:** Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. This class supports the needs of different learners; it is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible in the semester.
- **Statement Regarding Evaluations:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available from [the Gatorevals website](#). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [the evaluation system](#). Summaries of course evaluation results are available to students at the [public results website](#).

Honor Code

UF students are bound by The Honor Pledge which states, *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."* The Honor Code (sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. **I DO NOT TOLERATE CHEATING** and will report any violations. If you have any questions or concerns, please consult with the instructor or TAs in this class.

General Education

AST 1002 meets the requirements for a General Education physical science (P) course. Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment,

and the relevant processes that govern physical systems. Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments. A minimum grade of “C” is required for general education credit.

Gen Education Student Learning Objectives

- Students demonstrate competence in the terminology, concepts, methodologies and theories used within the discipline.
- Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms appropriate to the discipline.
- Students analyze information carefully and logically from multiple perspectives, using discipline specific methods, and develop reasoned solutions to problems.

General Education Subject Area Objectives

Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

Additional UF Resources

A list of additional UF resources can be found within the Canvas page for this course

Preliminary Lecture Schedule (Subject to Change)

The lectures will follow the textbook fairly closely. The table below shows the approximate dates when each topic/chapter is scheduled to be covered.

Lecture Date	Lecture Content	Weekly Reading Assignment
Week 1 (1/11)	<i>Our Place in the Universe</i> – An introduction to basic concepts in astronomy such as distance scales.	Chapters 1,2.1
Week 2 (1/18)	<i>Discovering the Universe for Yourself</i> – Learn about constellations, and how Sun-Moon-Earth configurations result in Moon phases and Solar and Lunar eclipses. Understand the reason for seasons. <i>The Science of Astronomy</i> – Learn about the roots	Chapters 2.2-2.4, 3

	of astronomy and how the scientific method has been used over hundreds of years to interpret the motions of planets and understand the nature of our Solar System	
Week 3 * (1/25)	<i>Making Sense of the Universe: Understanding Motion, Energy, and Gravity</i> – Learn about the laws of gravity and motion.	Chapter 4
Week 4 (2/1)	<i>Light: The Cosmic Messenger</i> – Learn the nature of light and how astronomers observe various light wavelengths with telescopes to learn about astrophysical phenomena	Chapters 5, 6.1
Week 5 (2/8) Exam	<i>Formation of the Solar System</i> – Using the scientific method and observations discussed in this class, we discuss likely scenarios for the formation of our Solar System <i>Earth and the Terrestrial Worlds</i> – Properties of the inner planets are discussed and compared to Earth	Chapters 6.2-6.4, 7.1, 7.4-7.5
Week 6 (2/15)	<i>Jovian Planet Systems</i> – Properties of the outer gas giants are discussed and compared to Earth <i>Asteroids, Comets, and Dwarf Planets: Their Nature, Orbits, and Impacts</i> – Learn about the nature of these other constituents of the Solar System which reveal clues about the origin and evolution of our planetary system.	Chapters 8, 9
Week 7 (2/22)	<i>Other Planetary Systems</i> – Learn how we find planets around other stars and the properties of these planetary systems <i>Our Star</i> – Properties of the Sun and the mechanics of nuclear fusion are discussed.	Chapters 10, 11
Week 8 (3/1)	<i>Our Star</i> – Properties of the Sun and the mechanics of nuclear fusion are discussed. <i>Surveying the Stars</i> – Learn the properties of stars and how they are measured, including some distance determination techniques. Discover how color-magnitude diagrams are used to determine ages and binary star systems to estimate stellar masses.	Chapters 11, 12
Week 9 (3/8)	<i>Star Stuff</i> – Discover how the stars form out of the interstellar medium. Follow the timeline for typical stars from infancy to death <i>The Bizarre Stellar Graveyard</i> – Learn about the	Chapters 13,14

	dense remnants of stars and discuss the unusual gravitational effects observed near Black Holes	
Week 10 (3/15) Exam	<i>The Bizarre Stellar Graveyard</i> – Learn about the dense remnants of stars and discuss the unusual gravitational effects observed near Black Holes	Chapter 14
Week 11 (3/22)	<i>Our Galaxy</i> – Learn the properties of our Milky Way galaxy and how the scientific method has been used to learn the nature of this large system of stars, gas and dust.	Chapter 15
Week 12 (3/29)	<i>Galaxies and the Foundation of Modern Cosmology</i> – Discover the different types of galaxies in the Universe and how they compare to the Milky Way. Learn about galaxy interactions and mergers, galaxy evolution and supermassive black holes	Chapter 16
Week 13 (4/5)	<i>Dark Matter, Dark Energy, and the Fate of the Universe</i> – Discover the importance of dark matter and how it has been identified in galaxies and larger scale structures.	Chapter 17
Week 14 (4/12)	<i>The Beginning of Time</i> – Learn how we observe the effects of the Big Bang around us today including the cosmic microwave background, universal expansion and acceleration, the curvature of space and the formation of structure.	Chapter 18
Week 15 (4/19)	<i>The Beginning of Time</i> – Learn how we observe the effects of the Big Bang around us today including the cosmic microwave background, universal expansion and acceleration, the curvature of space and the formation of structure. <i>Life in the Universe</i> – Learn about the history and properties of life on Earth, life in the solar system, and search for life elsewhere	Chapters 18, 19
Exam Week	Final Exam	Cumulative – all chapters