

# Astronomy 1002: Discovering the Universe

Spring 2025 - 3 Credits

## Lecture Times and Locations:

Mondays, Wednesdays and Fridays: 11:45 AM – 12:35 PM (5) in FLG 0280

Instructor: Prof. Jason Dittmann  
Office: Bryant Space Sciences Center 210  
Office Hours: Mondays 10-11AM, Thursdays 3-4PM and by appointment  
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Course Website: Canvas/E-Learning

**Textbook:** You must purchase the required e-text with access to Mastering Astronomy: *The Essential Cosmic Perspective*, 9th edition, by Bennet, Donahue, Schneider, Voit. Doing this through UFAllAccess, which will provide you with your access code, is highly recommended. Other references may be used for supplemental information.

**Brief Description:** This course provides a comprehensive look at modern astronomy, emphasizing the use of the scientific method and the application of physical laws to understand the universe including earth and its environment. throughout this course, students will develop the ability to discern scientific knowledge from non- scientific information by using critical thinking. This is an elementary, largely non-mathematical survey of our universe of stars, planets and galaxies. This course acquaints the student with the development of astronomy as a human activity with how we know as well as what we know. The course is intended primarily for those not majoring in physical science or mathematics.

## General Education Course Description

This course 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.

NOTE: All topics in this course will be taught objectively as objects of analysis, without endorsement of particular viewpoints, and will be observed from multiple perspectives. No lesson is intended to espouse, promote, advance, inculcate, or compel a particular feeling, perception, or belief. Students are encouraged to employ critical thinking and to rely on data and verifiable sources to explore readings and subject matter in this course. All perspectives will be respected in class discussions.

### **State Core Student Learning Outcomes:**

- Students will define terms used to measure and describe the universe.
- Students will explain the processes involved in the formation and evolution of celestial bodies over astronomical time according to different models and theories.
- Students will describe how scientific theories evolve in response to new observations and critically evaluate their impact on society.
- Students will formulate empirically testable hypotheses derived from the study of physical processes and phenomena.
- Students will apply logical reasoning skills through scientific criticism and argument to separate science from non-science.
- Students will gather and analyze astronomical data and communicate results in graphic and written forms.

### **Course Learning Objectives:**

- To provide students with a broad overview of modern astronomy. This will be accomplished through lectures and weekly reading assignments. Students will be able to define common astronomical terms and explain basic concepts and theories for a range of astrophysical phenomena.
- To teach the students the scientific process and how we can understand the Universe using basic physical laws derived on Earth. This will be accomplished through lectures and in-class discussions as well as homework assignments. Students will gain an understanding of how the scientific method is applied to the field of astronomy.
- To review the major scientific developments in astronomy and summarize their impacts on society and our environment such as recognizing our place in the Universe, comparing energy sources, and how atmospheric effects of planets influence climate change. Students will be able to critically evaluate the difference between good science and bad science. Evaluations will be based on in-class discussions, exams and an observing project.
- To teach scientific reasoning. Scientific reasoning is the use of logic, observations, and critical thinking to interpret the world around you. This will be accomplished through in-class discussions, homework assignments and the observing project. Students will formulate empirically-testable hypotheses derived from the study of physical process and

phenomena and apply logical reasoning skills through scientific criticism and argument. These skills will serve you well in your daily lives regardless of what career you pursue.

- To improve the scientific literacy. Literacy is the basic concepts and terminology of science is necessary if you which to follow science stories in the news or make informed decisions (such as voting) on issues that pertain to science. This will be accomplished through in-class discussions about current news topics in astronomy and as part of the observing project.
- To help students learn to communicate scientific ideas clearly and effectively using oral, written or graphic forms. This will be done through in-class discussions (oral) and as the written component of the observing project.

### Detailed Description of the Graded Course Structure

**Worksheets:** Worksheets will be assigned during many classes to give you an opportunity to review the material and give the instructor the opportunity to check your comprehension of the material. Worksheets typically will be due at the end of the class they are assigned and are not accepted late. Class participation is expected and will greatly help you complete this work.

The number and frequency of these assignments is at the discretion of the instructor. The lowest few (depending on the total number given) will be dropped or counted as extra credit for your final grade. Given this lenient policy, please do not contact the instructor to make up this work unless you have a serious ongoing problem, which should be an excused absence consistent with university policy: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

**Homework:** Homework will be assigned throughout the semester through Mastering Astronomy. Late homework will be penalized 10% per day.

**Exams:** There will be three exams given over the course of the semester: two midterm exams and a final exam. The midterm exams will cover material in each of the first and second thirds of the course and the final exam will be cumulative; all exams will include material from lecture and the book, though students should use the lectures as a study outline. The Final Exam is scheduled for 3:00PM – 5:00PM on 04/29/2024. Bring a working scientific calculator without memory capability, at least two pencils (with erasers), and your ID with you to all exams.

**Class Project:** A handout and discussion to explain the class project will be provided at the appropriate time. All guidelines including due dates will be provided in the handout.

**Essay Exam:** There will be one in-class written essay examination where students will be provided with an article about a scientific discovery relevant to course material and be required to summarize the article and connect it to concepts learned in class.

**Extra Credit:** A handout and discussion to explain the extra credit options will be provided early in the semester. All guidelines including due dates will be provided in the handout.

**Course Grade Summary Breakdown:** Each of the components of class described above will be assigned the following weights to determine your final score:

- Worksheets: 10%
- Homework: 15%
- Class Project: 15%
- Two Midterm Exams: 15% each
- Final Exam: 25%
- Essay Exam: 5%

**Grading Scale:** (<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>)

<u>Score</u>	<u>Grade</u>	<u>Score</u>	<u>Grade</u>	<u>Score</u>	<u>Grade</u>
93% – 100%	A	80% – 82%	B–	67% – 69%	D+
90% – 92%	A–	77% – 79%	C+	63% – 66%	D
87% – 89%	B+	76% – 73%	C	60% – 62%	D–
83% – 86%	B	70% – 72%	C–	< 60%	E

### Class/University Policies

Please put your phones and, unless you are taking notes, your laptops away during class: no Facebook, Twitter, texting, etc.

You may need to make calculations on occasion, so you should always have available a scientific calculator in addition to your usual materials for taking notes.

#### Attendance policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

#### Students requiring accommodation

Students 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/>. 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.

#### UF course evaluation process

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 at <http://gatorevals.ua.ufl.edu/students>. 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 <http://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <http://gatorevals.aa.ufl.edu/public-results/>.

### **University Honesty Policy**

University of Florida students are bound by the Honor Pledge. On all work submitted for credit by a student, the following pledge is required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Student Honor Code and Conduct Code (Regulation 4.040) specifies a number of behaviors that are in violation of this code, as well as the process for reported allegations and sanctions that may be implemented. All potential violations of the code will be reported to Student Conduct and Conflict Resolution. If a student is found responsible for an Honor Code violation in this course, the instructor will enter a Grade Adjustment sanction which may be up to or including failure of the course. For additional information, see <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>.

### **Honor Code and AI**

The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. **This includes the use of AI:** no student is allowed to use any AI tools (e.g., including Grammarly) to assist with any assignments in this course. Doing so will be considered a violation of the student honor code. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### **In-class recording**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium,

to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party-note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### **Procedure for conflict resolution**

Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact Elizabeth Lada ([elada@astro.ufl.edu](mailto:elada@astro.ufl.edu), 352-294-1862). Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (<http://www.ombuds.ufl.edu>; 352-392-1308) or the Dean of Students Office (<http://www.dso.ufl.edu>; 352-392-1261).

### **Resources available to students**

#### Health and Wellness

- U Matter, We Care: [umatter@ufl.edu](mailto:umatter@ufl.edu); 352-392-1575.
- Counseling and Wellness Center: <http://www.counseling.ufl.edu>; 352-392-1575.
- Sexual Assault Recovery Services (SARS): Student Health Care Center; 352-392-1161.
- University Police Department: <http://www.police.ufl.edu>; 352-392-1111 (911 for emergencies).

#### Academic Resources

- E-learning technical support: [learning-support@ufl.edu](mailto:learning-support@ufl.edu); <https://elearning.ufl.edu>; 352-392-4357.
- Career Connections Center: Reitz Union; <http://www.career.ufl.edu>; 352-392-1601.
- Library Support: <http://cms.uflib.ufl.edu/ask>.
- Academic Resources: 1317 Turlington Hall; 352-392-2010; <https://academicresources.clas.ufl.edu>.

Writing Studio: 2215 Turlington Hall; <http://writing.ufl.edu/writing-studio/>

## Tentative Class Schedule

<u>Week #</u>	<u>Week Starting (# of Classes)</u>	<u>Lecture #'s</u>	<u>Topics Discussed</u>
1	01/13 (3)	1 – 3	Introduction to the Course, Chapter 1 (A Modern View of the Universe)
2	01/20 (2)	4 – 5	Chapter 2 (Discovering the Universe for Yourself)
3	01/27 (3)	6 – 8	Chapters 2 / 3 (The Science of Astronomy)
4	02/03 (3)	9 – 11	Chapters 3 / 4 (Making Sense of the Universe: Understanding Motion, Energy, and Gravity)
5	02/10 (3)	12 – 14	Chapters 4 / 5 (Light and Telescopes: Reading Messages from the Cosmos)
6	02/17 (3)	15 – 17	Chapters 5 / 6 (Formation of the Solar System), Midterm Exam
7	02/24 (3)	18 – 19	Chapter 7 (Earth and the Terrestrial Worlds)
8	03/03 (3)	20 – 22	Chapters 8 (Jovian Planet Systems) / 9 (Asteroids, Comets, and Dwarf Planets: Their Nature, Orbits, and Impacts)
9	03/10 (3)	23 – 25	Chapters 10 (Other Planetary Systems: The New Science of Distant Worlds) / 11 (Our Star)
10	03/17 (0)	NA	Spring Break
11	03/24 (3)	26 – 28	Chapters 12 (Surveying the Stars) / 13 (Star Stuff), Midterm Exam
12	03/31 (3)	29 – 31	Chapters 13 / 14 (The Bizarre Stellar Graveyard)
13	04/07 (3)	32 – 33	Chapters 15 (Our Galaxy) / 16 (A Universe of Galaxies) (Written Exam)
14	04/14 (3)	34 – 36	Chapters 16 / 17 (The Birth of the Universe)
15	04/21 (3)	37 – 39	Chapters 17 / 18 (Dark Matter, Dark Energy, and the Fate of the Universe)
16	04/29 (NA)	NA	The final exam is 04/29 at 3:00 PM – 5:00 PM.

Assignment Notes for the Course Schedule in the Table Above  
(see also the detailed description of the graded course structure above)

- Regular textbook readings are assigned according to the schedule of the content.
- Worksheets are assigned and completed during some lectures.
- The schedule of homework assignments, one per chapter, is provided in Mastering Astronomy where these are completed.
- A separate handout thoroughly describes all guidelines for the class project.

Course Content Summary

**Course Introduction and Chapter 1:** A review of the syllabus, course expectations, mathematics expectations; an overview of the large scale and history of our universe and our place within it.

**Chapter 2:** Explanations and the importance of the motion of the Sun and stars in the sky.

**Chapter 3:** The history of how humans discovered facets of astronomy, including the construction of how science generally works and what can be classified as science.

**Chapter 4:** Basic properties of motion and energy from introductory physics that are important for understanding astronomy.

**Chapter 5:** The nature of light, how we use it to learn about the cosmos, and how we collect it.

**Chapter 6:** How the nebular theory for the formation of star systems explains the various properties that we observe.

**Chapter 7:** Geological and atmospheric properties of the inner planets.

**Chapter 8:** Geological, atmospheric, and orbital properties of the outer planets.

**Chapter 9:** The nature of the leftover planetesimals of the solar system.

**Chapter 10:** Properties of exoplanets and how we know them.

**Chapter 11:** Properties of the layers of the Sun.

**Chapter 12:** Properties of the stars and how we measure or calculate these: brightness, distance, luminosity, temperature, and mass.

**Chapter 13:** The life cycles of stars of different masses.

**Chapter 14:** A description of white dwarfs, neutron stars, and black holes, extremely compact stellar remnants and the events that created them.

**Chapter 15:** The content, structures, and motions in our Milky Way Galaxy.

**Chapter 16:** The properties, formation, and evolution of the larger galaxy population.



**Chapter 17:** A description of the big bang theory, including the conditions of the universe shortly after its creation.

**Chapter 18:** The elusive nature of dark matter and dark energy, the constituents of most of the energy density of our universe.

**Chapter 19:** Examining our understanding of life on Earth and its history to question the possibilities of life outside of the Earth.