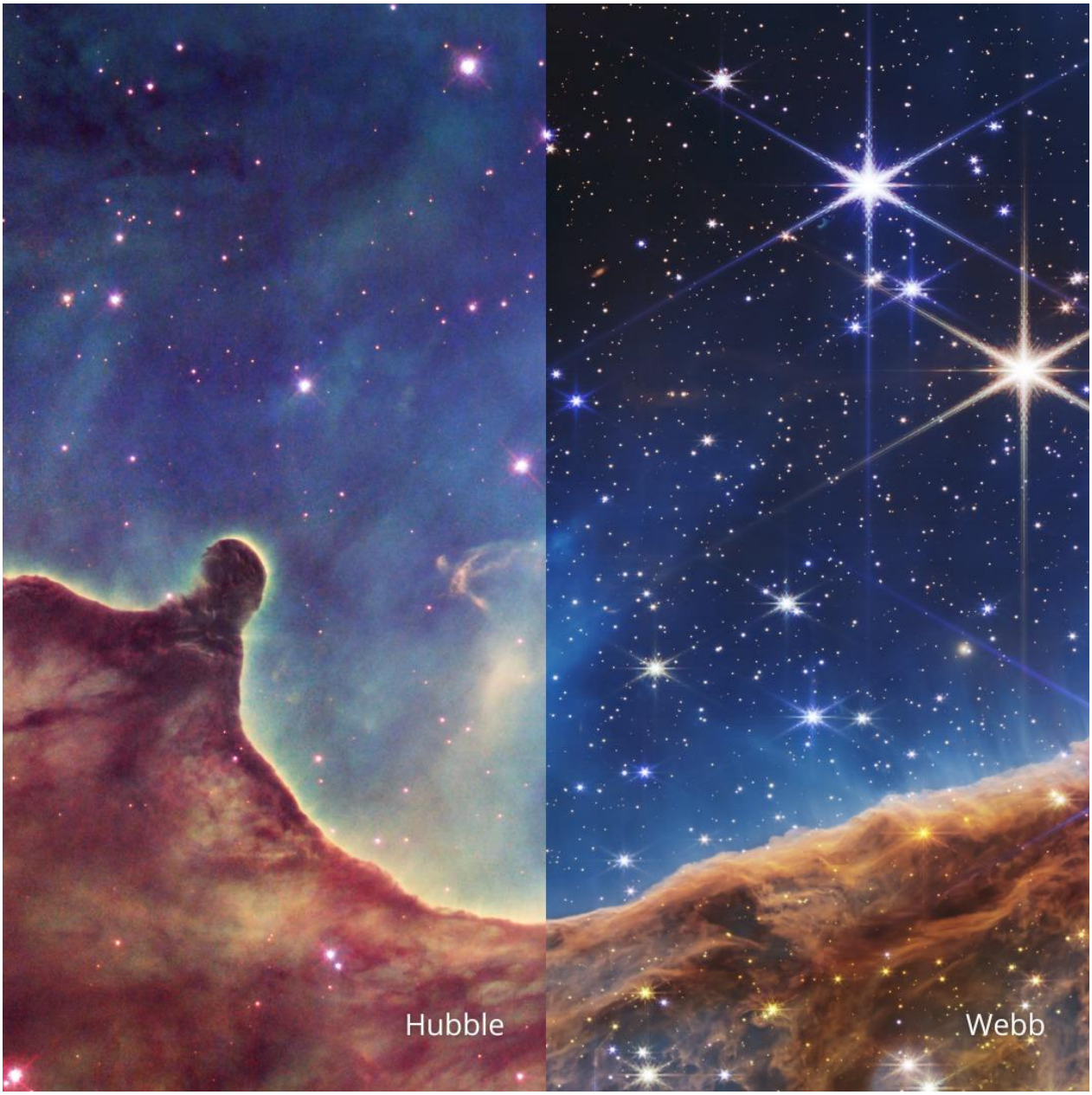
IDH 2930: Honors (Un)Common Reads, A Speedy Guide to Cosmos



Images of the Carina Nebula, taken from the Hubble Space Telescope (1976) and the James Webb Space Telescope (2020)

I. General Information

Class Meetings

- Spring 2025
- Tuesday, Period 8 (3:00-3:50PM)
- Little Hall 117

Instructors

Dr. Elizabeth Lada
Department Chair
Department of Astronomy and Astrophysics
Office Location: Bryant Space Center, Room 211-E
Office Hours: 1-2PM on Wednesdays, and 2-3PM on Thursdays
Email: elada@astro.ufl.edu

Meir Schochet
Undergraduate Peer Instructor
Senior Astrophysics Major, Philosophy Minor
Office Hours Location: Bryant Space Center, Room 217
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Required Readings and Works

- **Tyson, Neil deGrasse (2017), Astrophysics for People in a Hurry. IBSN 978-0393609394**

Description

"The universe is under no obligation to make sense to you" – Dr. Neil deGrasse Tyson.

In the modern age, Astrophysics is a burgeoning field even amongst STEM disciplines. New discoveries from gravitational wave events to images from the James Webb Space Telescope that are revealing new features about even our own solar system have revolutionized our understanding of the universe. Despite this, many regard the cosmos as impossibly complex and difficult to understand (like how Dr. Tyson describes it above). The field of astrophysics regularly observes new phenomena that are not sufficiently explained by our current physical theories, and many remain unaware of the gravity (pun intended) of these discoveries. In this course we will cover the book "Astrophysics for People in a Hurry" by Dr. Neil deGrasse Tyson. This text is a short expose on some core concepts and problems in modern astrophysics. Some discussions within the text include the origin and structure of the Universe, how gravity impacts the bodies in the sky, and phenomenological descriptions of light, dark matter, and dark energy. In this class, we will try to introduce students to the tremendously large field of astrophysics and push them to acquire skills like the ability to reason through fundamental physical principles and how to digest peer-reviewed scientific literature.

Course Objectives

- To be able to broadly explain the different physical phenomena that make up the universe and apply those explanations to astrophysical questions and problems.
- To describe the history of the universe from a modern cosmological lens and the existing theories for its future evolution.

- To evaluate the background and validity of the various explanations of physical laws and assumptions describing the universe.

Course Expectations

Each week students will be expected to read a chapter of the assigned text and to watch associated online materials (YouTube videos, linked articles, etc.) posted to the class Canvas page. There will be short weekly writing reflections **in class** to ensure that students understand chapter concepts for participation in discussions. In class, students will have the opportunity to ask questions and to discuss the chapter, related readings, and videos. Discussion participation is an expectation, and every member of class should come prepared to contribute even minimally every week and not merely just to listen. Your ideas are important, so you should share them!

II. Graded Work

Description of Graded Work

Assignment	Description	Requirements	Points
Scientific Paper Review Writeup	During the semester, students will review a paper to develop a deeper understanding from a preselected list of topics.	There will be a list of topics with some suggested papers for students to review and write a brief report on. If students decide to present on a paper other than those listed, those are subject to instructor approval.	10
Scientific Paper Presentation	Groups of students that read the same paper will be grouped together to present the paper's main findings in the final weeks of the course.	Present your paper's main findings along with your group during the final class dedicated to presentations	10
Scientific Paper Preparation Assignments	These assignments are meant to prepare for both the presentation and writeup for the chosen paper	1) Fifty to one hundred (50-100) words summary of paper abstract 2) Fifty to one hundred (50-100) words summary on plan for group presentation	10 (5 each)
Weekly Assignment	Every week, there will be a short in-class writing reflection to assess student takeaways from each chapter	In the beginning of each class, students will write down a brief, few sentence reflection to a given prompt about the content in the latest chapter. The lowest grade from these reflections will be dropped.	30 (3 each, drop lowest)

Attendance	Attendance is required for all classes. In the case of any absence, please contact the instructors.	Attendance at all classes. See instructor during syllabus week in the event of planned absences	15
Class participation	Informed, thoughtful, considerate, and active class participation is essential for creating a positive comprehensive learning environment.	Actively contribute to the class discussion through reflections, questions, or other interactions. This category shall be graded on a scale of zero to three (0-3) and students will earn a 100% if they sufficiently contribute during at least five (5) classes in the semester.	25
Total			100

Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academichttps://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/regulations/grades-grading-policies/

A	94 – 100%		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	84 – 86%		D	64 – 66%
B-	80 – 83%		D-	60 – 63%
C+	77 – 79%		E	<60

This scale may be lowered, but it will not be raised. Any changes to the grading scale will only be made to improve your grade in the class.

A minimum grade of B is required to earn Academic points towards your Honors Completion Requirements. (Exception: Honors Quest I and II sections require a C). Once you have earned your final grade in this course, please upload the course information and final grade from your Unofficial Transcript into your Honors Canvas Cohort: Honors Completion module to earn Honors Milestone / Completion credit.

Attendance and Participation:
Requirements for class attendance, make-up assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies//.

Attendance and participation in class meetings comprise 40% of your final grade. Attendance will be required for all classes, however in the event of any planned or unplanned absences, please contact the instructor during syllabus week or as early in the semester as is possible. This class should not be a burden, so please contact the instructors in case of any concerns.

AI Statement
Under no circumstances will any AI tools be allowed for any course-related assignments, including—for example—Grammarly. Everything submitted must be your original work. The consequences for using AI will be substantial.

III. Annotated Weekly Schedule

Week	Topics, Homework, and Assignments (subject to change)
Week 1	• **Topic:** Introductions and Syllabus Review • **Summary:** Class will involve introductions and a quick reading of the syllabus, followed by quick inquiries to begin the material. Resources for all assignments will be covered too [ex: arXiv , ADS] • **Required Readings/Works**: N/A • **Assignment:** Read Chapter 1, "The Greatest Story Ever Told" in the book. Also look over the Cosmic Calendar and watch the extra posted YouTube videos on Canvas. • **Note:** Meir will be out of town for this week because they will be attending a conference. They will be back for Week 2, so be on the lookout for an announcement about Week 1 class before drop-add week!
Week 2	• **Topic:** The Big Bang and the Baryon Asymmetry Problem • **Summary:** We'll cover the Big Bang and the Quark-Lepton Era of the universe. Larger themes will include the timeframe of the Big Bang, and the origin of the Baryon Asymmetry Problem. • **Required Readings/Works**: Chapter 1: "The Greatest Story Ever Told" • **Assignment:** Read Chapter 2, "On Earth As In the Heavens" in the book. Also read this short webpage on Susskind and Steinhart discussing the laws of physics, and watch the extra posted YouTube videos on Canvas.
Week 3	• **Topic:** The Emergence of Gravity • **Summary:** We'll cover the differences between the predictions from Newtonian versus Einsteinian gravity, and the underlying generality of the laws of physics. • **Required Readings/Works**: Chapter 2: "On Earth as in the Heavens" • **Assignment:** Read Chapter 3, "Let There Be Light" in the book. Also, select your final project topic this week and fill out the survey, and review the extra posted YouTube videos on Canvas.

Week 4	• **Topic:** Cosmic Microwave Background Radiation • **Summary:** We'll cover the expansion of the universe, and some phenomena associated with the Cosmic Microwave Background Radiation, like redshift. • **Required Readings/Works**: Chapter 3: "Let There Be Light" • **Assignment:** Read Chapter 4, "Between the Galaxies" in the book and review the extra posted YouTube videos on Canvas.
Week 5	• **Topic:** Galaxy Evolution and Typing • **Summary:** We'll cover the different morphological types of galaxies, and some bodies typically found in them, like Active Galactic Nuclei (AGN). • **Required Readings/Works**: Chapter 4: "Between the Galaxies" • **Assignment:** Read Chapter 5: "Dark Matter" in the book, and prepare to submit your chosen final project paper by next week.
Week 6	• **Topic:** Dark Matter • **Summary:** We'll cover the main hypotheses and evidence for the existence of dark matter, despite the apparent lack of direct observational evidence. • **Required Readings/Works:** Chapter 5: "Dark Matter" • **Assignment:** Read Chapter 6: "Dark Energy" in the book. Also review the extra posted YouTube videos on Canvas.
Week 7	• **Topics:** Dark Energy • **Summary:** We'll cover the dark energy explanation of the expanding universe that we briefly touch in Weeks 3 and 4. We'll also explore why dark energy explains expansion better than any other theory we currently have. • **Required Reading/Works:** Chapter 6: "Dark Energy" o **Extra:** Watch the PBS Spacetime Playlist on Dark Energy for a deeper understanding (Dark Energy YT Playlist) • **Assignment:** Read Chapter 7, "The Cosmos on the Table" in the book and submit a brief (50-100 word) summary of the abstract for your chosen paper for the final project
Week 8	• **Topics:** Stellar Nucleosynthesis and Supernovae • **Summary:** We'll cover the creation of elements not formed in the Big Bang (Hydrogen, Helium, trace Lithium) through the process of fusion in the core of stars. We will also explore how these elements are spread throughout the universe because of supernovae. • **Required Reading/Works:** Chapter 7: "The Cosmos on the Table" • **Assignment:** Read Chapter 8, "On Being Round" in the book and meet with your group for final project presentation planning. Submit a brief (50-100 word) summary of your plan for the final presentation.
Week 9	• **Topics:** Spherical Geometry in Space • **Summary:** We'll cover the logical justification for spherical geometry being the preferential shape of many massive astrophysical bodies. We'll also explore the consequences of this geometry and gravity to produce phenomena like gravitational lenses. • **Required Reading/Works:** Chapter 8: "On Being Round"

	• **Assignment:** Read Chapter 9, "On Being Round" in the book. Also review the extra posted YouTube videos on Canvas **(TBA: Week 10 class may be at the Campus Teaching Observatory, survey from earlier in the semester will determine whether class is in person this day).**
Week 10	• **Topics:** Electromagnetic Spectrum of Radiation and Types of Telescopes • **Summary:** This week we may not have a class during scheduled class time. We will instead possibly meet at CTO to explore how telescopes work and the different phenomena we can see with them. Our aim is to help the class understand the electromagnetic spectrum and how different telescopes utilize this spectrum in different ways. • **Required Reading/Works:** Chapter 9: "Invisible Light" • **Assignment:** Read Chapter 10, "Between the Planets" in the book. Also review the extra posted YouTube videos on Canvas, and make sure to submit your presentation plan on Canvas.
Week 11	• **Topics:** Interstellar/Interplanetary Medium and Solar System Phenomena • **Summary:** We will cover the basics of the interstellar medium surrounding Earth, how we probe it, and the deeper structure of our solar system that underlies phenomena like eclipses. • **Required Reading/Works:** Chapter 10: "Between the Planets" • **Assignment:** Read Chapter 11, "Exoplanet Earth" in the book. Also review the extra posted YouTube videos on Canvas, and review this page on the search for habitable planets with the James Webb Space Telescope (JWST).
Week 12	• **Topics:** Exoplanets • **Summary:** We'll develop an understanding of the vast number of extrasolar planetary systems that exist (and that can theoretically exist) in the universe. We'll also look at methods of detecting them like transits, lensing, and radial velocities. • **Required Reading/Works:** Chapter 11: "Exoplanet Earth" • **Assignment:** Prepare your presentations!
Week 13	• **Topic:** Presentations 1 • **Summary:** Groups 1-3 will present their papers (10 minutes to present, at least 2 minutes by each member of the group). Presentations will be followed up with 5 minutes of questions from other students and the instructor. • **Required Readings/Works**: N/A • **Assignment:** Groups 4-5, prepare your presentations!
Week 14	• **Topic:** Presentations 2 • **Summary:** Groups 4-5 will present their papers (10 minutes to present, at least 2 minutes by each member of the group). Presentations will be followed up with 5 minutes of questions from other students and the instructor. • **Required Readings/Works**: N/A • **Assignment:** N/A
Week 15	• **Topics:** Extra Week for Scheduling Issues • **Summary:** • **Required Reading/Works:** N/A • **Assignment:** N/A

IV. Required Policies

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
It is understood that valid absences may occur. If you have a valid documented excuse and notify the instructor by email in advance, you will be able to make up missed class discussions through written means.

UF Honor Code

The UF Student Honor Code (see dso.ufl.edu for details): We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. 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."

Honor Code violations include copying on an exam (or helping another student to copy) and/or turning in an exam for regrading that has been changed since it was graded by the instructor. Any student found responsible for an academic honesty violation in this course will forfeit any applicable exam drop policy and be recommended sanctions consistent with the offense.

Students Requiring Accommodation

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/. 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 Evaluations 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 https://gatorevals.aa.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 https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

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 (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. 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.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

In-Class Recordings

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 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.

Other Campus Resources

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu to refer or report a concern and a team member will reach out to the student in distress

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit shcc.ufl.edu

University Police Department: Visit police.ufl.edu or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608. Shands Emergency Room

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit gatorwell.ufsa.ufl.edu or call 352-273-4450

E-learning Technical Support: Contact the UF Computing Help Desk at 352-392-4357 or via email at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services. https://career.ufl.edu/

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. https://uflib.ufl.edu/find/ask/

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/

Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information. https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

Honors Program, 201 Walker Hall, 352-392-1519

Quick questions for an Honors advisor? Email advisor@honors.ufl.edu

Need an Honors advising appointment? Schedule via Microsoft Bookings: https://bit.ly/ufhonorsadvising