

Astronomy 2037: Life in the Universe

Course Dates for 2024 Fall:

August 22 – December 4

Lecture Times and Locations:

Tuesdays 1:55PM – 2:45PM (7)

Thursdays 1:55PM – 2:45PM (7) and 3:00PM – 3:50PM (8)

Lecture Locations:

Fine Arts B (FAB) 0103

Instructor: Dr. Jaehan Bae
Office: Bryant Space Sciences Center 316
Office Hours: Mondays noon-1PM, Wednesdays 1-2PM, and by appointment
Contact Information: jbae@ufl.edu (but please use the Canvas Inbox)

Course Website: Canvas/E-Learning

Textbook + Codon Learning Platform: Through UF All Access, you must purchase access to the digital bundle for *Life in the Universe*, 5th edition, by Bennet, Shostak, Schneider, and MacGregor e-text + Codon Learning. Go to bsd.ufl.edu/allaccess and opt-in to the course materials. You will then receive a link to register for the e-text, and the book + code will populate on your shelf. Other references may be used for supplemental information throughout the course.

Brief Description: The origin of life on Earth and the possibility of life elsewhere. A multidisciplinary approach is followed. Conditions for life to form and the likelihood that such conditions may exist elsewhere in the universe are discussed. Also considered are schemes proposed for the search for extraterrestrial intelligence (SETI).

General Education Course Description

This is a GenEd physical science (P) course.

Physical Science: The physical and biological sciences provide instruction in the basic concepts, theories, and terms of science and the scientific method. Courses focus on major scientific developments and their impacts on society and the environment. You will formulate empirically-testable hypotheses derived from the study of physical processes and living things and you will apply logical reasoning skills through scientific criticism and argument.

A minimum grade of “C” is required for general education credit.

In this course, students will use what they learn about our place in the universe and the nature of life on Earth to consider the possibilities of life outside of Earth in our universe. As required by astrobiology, students will construct a wholistic point of view of life using their understanding of a broad range of scientific subjects: astronomy, physics, biology, chemistry, and geology.

Student learning outcomes for a GenEd physical science course in astronomy are as follows:

I. Content — assessed through all graded categories below

- Know the basic concepts, theories, and terminology of natural science and the scientific method in astronomy.
- Know the major scientific developments in astronomy and their impacts on society.
- Know relevant processes that govern physical systems in astronomy.

II. Critical Thinking — assessed through all graded categories below

- Formulate empirically-testable hypotheses derived from the study of physical processes in astronomy.
- Apply logical reasoning skills effectively through scientific criticism and argument in astronomy.
- Apply techniques of discovery and critical thinking effectively to solve experiments and to evaluate outcomes.

III. Communication — assessed through the class project

- Communicate scientific findings clearly and effectively using oral, written, and/or graphic forms.
- Write effectively in several forms, such as in research papers and laboratory reports.

Detailed Description of the Graded Course Structure

Pre-class and Practice Test Assignments in Codon: To help you prepare for class for each chapter (except chapter 1), a pre-class assignment through Codon is due by the start the first class that discusses that chapter’s content. You will have unlimited attempts to get the problems in these assignments correct as you follow along with the readings.

Also through Codon, you will complete a practice test at the end of the study path before each of the midterm and final exams, which will help you review the material for that exam. You will receive credit for completion.

Given the strong need for timeliness and the very forgiving nature of these assignments, none of these pre-class or practice test assignments will be accepted late.

Homework and Study Path Prep Questions in Codon: Through Codon, one homework per chapter will be assigned. Homework will be open on the day the class discusses that chapter’s content and will be due by one week from the last class that discusses that chapter’s content.

Two homework with the lowest grades will be dropped. Also assigned to this part of the grade are the study path prep questions, designed for additional practice.

For both of these assignments, the first wrong answer is not penalized. Then Codon automatically applies a 10% deduction per wrong answer after this. Both of these assignment types will be accepted up to four days past their due date with a 25% automatic deduction.

Class Participation and In-Class 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. Discussing with other students and working in groups are strongly encouraged, but write your own answers without looking at the other students' paper. 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, but will be approximately 15 - 20 in total. The lowest few (depending on the total number given) will be dropped or counted as extra credit for your final grade (this action is completed at the very end of the semester and does not show up in the Canvas gradebook until then). 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/>.

Project: This is a course about Life in the Universe, and there will be a *design-your-own-alien* project. A handout and discussion to explain the project fully will be provided early in the semester. All guidelines including due dates will be provided in the handout.

Exams: There will be one midterm exam and a final exam. The midterm exam will cover material from approximately the first half of the class and the final exam will primarily cover material after the midterm exam; both will include material from lecture and the book. The midterm exam is scheduled for 10/17/2024 during the class (1:55 PM – 3:45 PM), and the final exam is scheduled for 12/11/2024 at 7:30 AM – 9:30 AM.

The start time of the exams is a hard deadline for the completion of all assignments relevant to that exam.

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

- Pre-class and Practice Test Assignments in Codon: 10%
- Homework and Study Path Prep Questions in Codon: 20%
- Class Participation In-Class Worksheets: 20%
- Project: 10%
- Midterm Exam: 20%
- Final Exam: 20%

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>
90% – 100%	A	77% – 79.99%	B–	64% – 66.99%	D+
87% – 89.99%	A–	74% – 76.99%	C+	60% – 63.99%	D
84% – 86.99%	B+	70% – 73.99%	C	57% – 59.99%	D–
80% – 83.99%	B	67% – 69.99%	C–	< 57%	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, so you should always have available a scientific calculator in addition to your usual materials for taking notes.
- Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting 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. Classroom accommodations can only be provided after appropriate verification.
- Responsible citizenship among college students includes honesty and integrity in classwork; regard for the rights of others; and respect for local, state, and federal laws as well as campus standards. Students are responsible for understanding the standards of the “Code of Student Conduct” and the Student Handbook. From the Academic Honesty Guidelines and Student Conduct Code in the University of Florida Undergraduate Catalog: “Academic Honesty: The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge are diminished by cheating, plagiarism, and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff, and administrators who practice dishonest or demeaning behavior.” Any student caught cheating will be referred to the Honor Code Chancellor.
- 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.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 <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Campus Resources

Health and Wellness

- *U Matter, We Care*: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center*: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).
- *University Police Department*: [Visit UF Police Department website](#) 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; [Visit the UF Health Emergency Room and Trauma Center website](#).

Academic Resources

- *E-learning technical support*: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- *Career Connections Center*: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- *Library Support*: Various ways to receive assistance with respect to using the libraries or finding resources.
- *Teaching Center*: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- *Writing Studio*: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- *Student Complaints On-Campus*: [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).
- *On-Line Students Complaints*: [View the Distance Learning Student Complaint Process](#).

Tentative Class Schedule

<u>Week #</u>	<u>Class #</u>	<u>Date</u>	<u>Topics Covered</u>
1	1	08/22	Course Introduction, Chapter 1 (A Universe of Life?)
2	2, 3	08/27, 08/29	Chapter 1 (A Universe of Life?) Chapter 2 (The Science of Life in the Universe)
3	4, 5	09/03, 09/05	Chapter 2 (The Science of Life in the Universe) – Chapter 3 (The Universal Context of Life)
4	6, 7	09/10, 09/12	Chapter 3 (The Universal Context of Life) – Chapter 4 (The Habitability of Earth)
5	8, 9	09/17, 09/19	Chapter 4 (The Habitability of Earth) – Chapter 5 (The Nature of Life on Earth)
6	10, 11	09/24, 09/26	Chapter 5 (The Nature of Life on Earth) – Chapter 6 (The Origin and Evolution of Life on Earth)
7	12, 13	10/01, 10/03	Chapter 6 (The Origin and Evolution of Life on Earth)
8	14, 15	10/08, 10/10	Chapter 7 (Searching for Life in Our Solar System)
9	16	10/15, 10/17	Midterm Review, Midterm Exam
10	17, 18	10/22, 10/24	Chapter 8 (Mars)
11	19, 20	10/29, 10/31	Chapter 9 (Life on Jovian Moons)
12	21, 22	11/05, 11/07	Chapter 10 (The Nature of Evolution of Habitability)
13	23, 24	11/12, 11/14	Chapter 11 (Exoplanets: Their Nature and Potential Habitability)
14	25, 26	11/19, 11/21	Chapter 12 (The Search for Extraterrestrial Intelligence)
15		11/26, 11/28	No Class (Thanksgiving Break)
16	27	12/03	Chapter 13 (Interstellar Travel and the Fermi Paradox)
17		12/11	Final Exam: 12/11 (7:30AM – 9:30AM)

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.
- The schedule of Codon Learning assignments, typically one of each type (pre-class and homework) per chapter, is provided where these are completed.

Course Content Summary

Course Introduction and Chapter 1: A review of the syllabus, course expectations, mathematics expectations; an overview to start asking what we are looking for, where / how we are looking.

Chapter 2: The history of how humans discovered facets of astronomy, including thoughts about life elsewhere; the construction of how science generally works and what can be classified as science is also discussed.

Chapter 3: An overview of the large scale structure of the universe so that it can inform us how to think about the possibilities of life.

Chapter 4: The history of life on Earth and the importance of the Earth's geology.

Chapter 5: How we define life and its basic properties, notably those at the microscopic level.

Chapter 6: Where and how life originated and how it continues to evolve to today.

Chapter 7: An overview of the solar system and how we explore the possibilities of life throughout.

Chapter 8: The search for life on Mars, including a discussion of this history, current efforts to search and test for life, and the properties of the red planet.

Chapter 9: The possibilities of life in the outer solar system, the best places being in deep subsurface oceans of gas giant moons.

Chapter 10: The concept of the habitable zone and implications of its basic definition.

Chapter 11: Properties of exoplanets and how we know them.

Chapter 12: The probability of life in the universe and what we mean by intelligence.

Chapter 13: How might we or other beings travel in between the stars.