

Special Topics: Astrobiology

AST7939 (21498), Section 3535

Class Periods: M 8-9, 3:00-4:40 PM; W 8, 3:00-3:50 PM

Location: Room 401

Academic Term: Fall 2022

Instructor:

Charles M. Telesco

Email: telesco@ufl.edu, telesco@astro.ufl.edu

Mobile Phone Number: 352.328.9264

Office Hours: After class or by appointment

This course meets in person on Tuesday 1:55-2:45 pm and Thursday 1:55 - 3:50 pm. It carries 3 credits and entails 3 contact hours/week.

Course Description: Astrobiology examines the origin, evolution, distribution, and future of life in the Universe. It is a highly interdisciplinary field of science, drawing from all key science areas including astronomy, physics, chemistry, biology, geology, planetary science, and mathematics. As the only general prerequisite, the student is expected to be familiar with physics and mathematics at the undergraduate science-major level.

The key challenge for an introductory graduate-level astrobiology course is to not only introduce students from diverse academic backgrounds to the rich fabric of this field, but to also provide a palpable sense of what front-line astrobiology research is like. To accomplish this, we (1) use the textbook *Astrobiology: Understanding Life in the Universe* (2nd Edition), by Charles Cockell, to serve as the course backbone of concepts that underlie the field, and (2) consider more specialized readings from the broader scientific research literature to examine astrobiology research in more detail. Do not hesitate to make recommendations or bring issues to the instructor's attention.

Learning Objectives: By the end of this course, graduate students should have:

- Acquired a firm grounding in the disciplines comprising astrobiology;
- Established the foundation for reading fundamental literature in the field of astrobiology;
- Gained confidence in their abilities to engage in cross-disciplinary learning beyond their field of expertise.

Required Textbook:

Astrobiology: Understanding Life in the Universe

Charles S. Cockell

Second Edition, 2020

ISBN 9781119550358 (paperback)

ISBN 9781119550396 (epub)

ISBN 9781119550303 (adobe pdf)

Course Structure and Schedule:

The course textbook is *Astrobiology: Understanding Life in the Universe*, by Charles Cockell, 2nd edition. The overall structure of the course is organized around the flow of material in that textbook, which serves as a convenient organizational backbone. The course is loosely divided into five main themes, represented in Canvas as modules. The left-hand table below shows how the textbook chapters map into these main themes (= modules). The right-hand table shows the approximate weekly course schedule. You should take note of the chapters that will be discussed each week and which you should have read prior to class time.

Flow of Course with Textbook			
		Textbook	Charles Cockell, 2nd edition
Theme	Module	Chapter	Astrobiology: Understanding Life in the Universe
Basics	1	1	Astrobiology
		LIFE AS WE KNOW IT	
		2	What is Life
		3	Matter & Life
		4	Molecular Structure of Life
Complexity	2	5	Cellular Structure of Life
		6	Energy for Life
		7	Limits of Life
		8	Tree of Life
		ASTRONOMICAL CONTEXT	
Origins	3	9	Universe, Solar System, Elements of Life
		10	Astrochemistry: Carbon in Space
		EARTH & LIFE EVOLVING TOGETHER	
		11	Early Earth: First Billion Years
		12	Origin of Life
Evolution	4	13	Early Life on Earth
		14	Geology of a Habitable World
		15	Co-evolution of Life & a Planet: Rise of Oxygen
		16	Mass Extinctions
		LIFE BEYOND EARTH: Our Solar System	
Beyond	5	17	Habitability of Planetary Bodies
		18	Astrobiology of Mars
		19	Ocean Worlds & Icy Moons
		LIFE BEYOND EARTH: The Stars	
		20	Exoplanets & the Search for Life
		21	Search for Extraterrestrial Intelligence
		22	Our Civilization

AST7937 Astrobiology, Fall 2022				
Week	Class Date	Chapt	Module	Class #
1	August	25	1/2	1
2		30	3	3
	September	1	4	4/5
3		6		6
		8	5	7/8
4		13	2	9
		15	6	10/11
5		20		12
		22	7	13/14
6		27		15
		29	8	3
7	October	4	9/10	18
		6	Test 1	19/20
8		11	11	21
		13	12	22/23
9		18	13	4
		20	14	25/26
10		25	15	27
		27		28/29
11	November	1	17	30
		3		31/32
12		8	18	5
		10		34/35
13		15	19	36
		17		37/38
14		22	20	39
		24	Holiday	n/a
15		29		40
	December	1		41/42
16		6	Test 2	43

Course Procedures:

There are three resources that will serve as the platform for each class:

1. Your textbook;
2. The PowerPoint slides developed by the instructor and based on that textbook. These are available for viewing and download in the Canvas Modules;
3. Outside reading of important or key scientific papers, which will also be made available as pdf files or as links in Canvas.

PowerPoint Slides: The PowerPoint slides are provided as a distillation of the contents of the book. Many of the figures are from the textbook, but others have been added for further clarification or to make additional points. It is recommended that you read carefully the chapter in the textbook, which will provide more detail and continuity and serve as a backdrop for consideration of other course content. Use the PowerPoint slides either in parallel with your reading or as a review when you finish the chapter.

During class, we will not go through all the PowerPoint slides. I will also tend to go through them fairly quickly, since you have them available to you on-line. However, I strongly urge you to ask questions, so we can slow down and focus on those concepts that you need more time on. Discussion about the slide content or related topics will take place both during and after the slides are presented. All students are expected to have already read the material and be actively involved in the discussions.

Primary Literature and Key Papers: During the semester you will be assigned a peer-reviewed literature article relevant to astrobiology. You will write a critical review of that research article as if you were reviewing the paper for a professional journal. You will also review and lead the discussion of an assigned key scientific paper from the literature. Papers will be posted on Canvas. For practical logistical reasons, the exact format and timing of these activities will depend upon the number of students enrolled in the course and will be clarified further during the first week of classes.

Written Exams: There will be two written exams taking the form of short answers and essays.

#1: Written Exams (2 x 35%)

There will be two written exams taking the form of short answers and essays. The exam dates are indicated on the attached scheduled. They will cover all aspects of the course content.

#2: Primary Astrobiology Literature Analysis (15%)

You will be assigned a peer-reviewed literature article related to astrobiology. You will be expected to write a critical review of the research article as if you were reviewing the paper for a professional journal. You will be provided formatting information. You must not plagiarize or cut-and-paste from the article or websites.

#3: Key Paper (15%)

Each student will be assigned a paper of historical importance to astrobiology. Beginning in week 3 or 4, each student will lead a short class discussion of that paper. The presentation format and procedure will be outlined during the first week of the course. All students are expected to have read every assigned paper in advance of the class and be actively involved in the discussions.

More information on UF grading policy may be found at:

- <http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>
- <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Grading Scale

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

Communications: Outside of class time, the current plan for communication from the instructor to the entire class will be via the Canvas "Announcements" page. One-on-one communications between the student and instructor will be by e-mail. Please keep in mind that only your official UF email (as provided by the UF Registrar) will be used for all email communication: no gmail or other non-UF mail services are permitted for official communications. As noted in the course description, this Covid-motivated distance-learning experience is new for all of us, and we are open to changing procedures as needed to make this a better experience. Do not hesitate to make recommendations or bring issues to the instructor's attention.

Attendance Policy, Class Expectations, and Make-Up Policy:

All classes will be held in person. Your attendance and active participation in the class are required and will be noted.

- Excused absences must be consistent with university policies in the Graduate Catalog: (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.
- Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

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.

Students Requiring Accommodations: 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.

Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://gatorevals.aa.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://gatorevals.aa.ufl.edu/>.

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 specifies (see: <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) 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 in this class.

Software Use: All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as

appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy: There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

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

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.