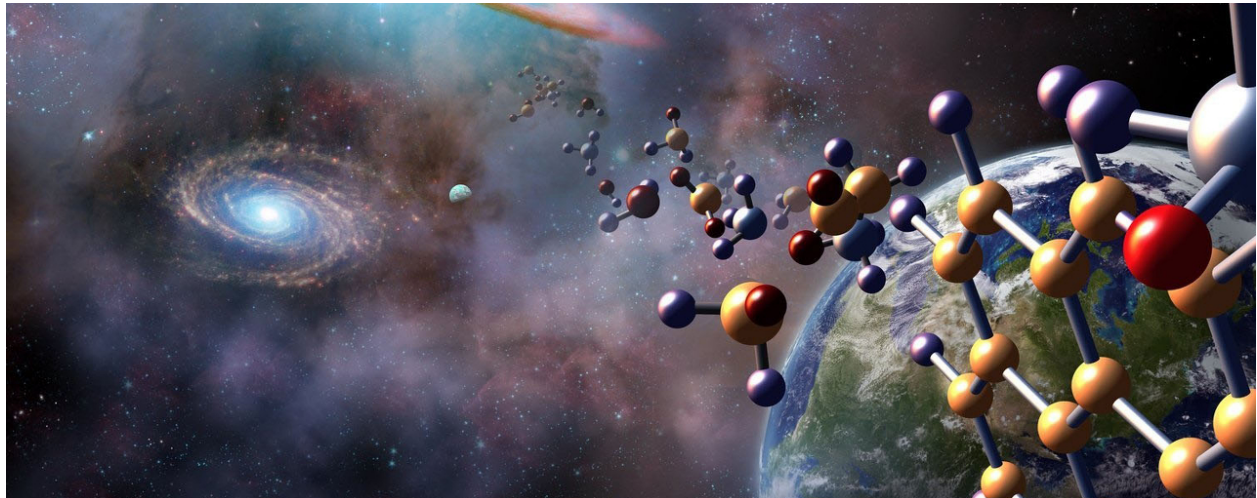


EPS SCI 3 ASTROBIOLOGY

Fall 2023

Lecture: MW 2:00–3:15 pm, Moore 100

<https://bruinlearn.ucla.edu/courses/141125>

Welcome to Astrobiology! Our course is designed to help non-science majors and others fulfill a general education requirement while learning about the origin and evolution of life on Earth and in the universe. We describe what makes our universe and planet habitable, what early or extreme life on Earth looks like, the conditions required for life, and the search for life and ET in the Solar System and beyond. In the process, we describe the scientific method and help you sharpen your critical thinking skills. We address some of the most important scientific questions of our time with engaging lectures supported by videos, demonstrations, and active learning activities.

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1. Meet your Faculty and TAs

Instructors:

Name	Office	Email	Office hours
Jean-Luc Margot	Geology 5642	jlm@epss.ucla.edu	TBD
Tina Treude	Slichter 5859	ttreude@g.ucla.edu	TBD

Teaching assistants:

Name	Office	Email	Office hours
Emily Klonicki	Slichter 5877	eklonicki@g.ucla.edu	
Boontigan Kuhasubpasin	Geology 1813	boontigan@g.ucla.edu	
Quin Parker	Geology 4677	qparker28@g.ucla.edu	
Emily Whittaker	Geology 5656	emilywhittaker@g.ucla.edu	

2. Course Organization

This course will consist of two 75-minute-long lectures per week and one fifty-minute-long discussion section per week. Attendance to lecture or discussion sections is not required but strongly encouraged. In the lecture, we will describe the course material, perform demonstrations, and active learning exercises. In discussion sections, you will solve quantitative problems and review the more difficult points with a teaching assistant. We may also hold review sessions prior to any exams to answer any questions about the course material.

We promise to strive during each class to create an environment that is engaging and welcoming to all students. We encourage you to constantly refer back to this syllabus, specifically the “Course Schedule” section, or Bruinlearn, throughout the quarter, as the schedule may evolve in response to circumstances beyond our control.

3. Course Materials

The required textbook for this course is

David Catling “[Astrobiology: A Very Short Introduction](#)”, Oxford U. Press, 2014.

The textbook can be purchased at your favorite bookstore for approximately \$11.

Warning: you will automatically be charged a fee by the UCLA bookstore for a 180-day rental of the eBook version of the book, unless you explicitly opt out by Friday of the second week of classes. If you want to rent the eBook version, do nothing. If you do not want to rent the eBook version, you must take action to opt out. Any questions regarding this program should be directed to inclusiveaccess@asucla.ucla.edu.

4. Learning Goals

1. Students will acquire an informed appreciation of scientists, scientific research, and technology.
 - a. Students will recognize the benefits of science to society or their everyday life.
 - b. Students will express interest in supporting or contributing to the sciences.
2. Students will develop information literacy.
 - a. Students will be mindful of information they encounter, recognizing contexts or situations when it is necessary to seek out other sources or data.
 - b. Students will identify, locate, and critically evaluate information sources to ensure they are reliable, accurate, and scholarly, such as peer-reviewed scientific literature.
 - c. Students will explain the peer-review process in science and its role in critical evaluation and validation of published, scientific findings.
3. Students will actively engage in the scientific process of inquiry, analysis, problem-solving, and quantitative reasoning.
 - a. Students will explain how scientists answer scientific questions and test a hypothesis.
 - b. Students will make reasonable predictions of experimental outcomes based on observation, measurements, and/or scientific concepts learned during the class.
 - c. Students will become confident working with numerical data and appreciate order-of-magnitude estimates.
 - d. Students will estimate and complete calculations to solve a quantitative problem.
 - e. Students will apply units of measurement to quantities (e.g., size, mass, time).
4. Students will make evidence-based decisions in a wide array of science and non-science contexts.
 - a. Students will distinguish between opinion and fact.
 - b. Students will use reliable, scholarly information sources before accepting or formulating a conclusion.
 - c. Students will draw conclusions or make judgements about experimental results informed by critical thinking, that is, a comprehensive exploration of ideas and systematic engagement with the scientific process.
5. Students will develop scientific literacy by addressing current, critical issues and topics in science that are personally meaningful in daily life and/or connected to the needs of society (e.g., climate change, vaccination, evolution).
 - a. Students will clearly state the significance or relevance of a research question or problem (i.e. state why scientists are motivated to study the issue or topic).
 - b. Students will discuss societal impacts by citing examples of the ways in which scientists and scientific research contribute to society.
 - c. Students will describe the interactions between humans and their physical world and the positive and negative effects of this interaction.
 - d. Students will explain why some issues perceived as “controversial” in the public domain are not considered “controversial” among scientists.
6. Students will recognize fundamental scientific principles and the connections between different domains of science.
 - a. Students will experience the interdisciplinary nature of science.
 - b. Students will describe the nature, organization, and evolution of living systems.
 - c. Students will explain the origin and physical processes of the planet earth and the surrounding universe.
 - d. Students will differentiate between a scientific theory, hypothesis, fact, or law.

5. Cultivating an Inclusive Classroom Together

As professors and TAs, we are committed to ensure that our classroom environment is safe and welcoming. We will strive to foster a classroom environment that is inclusive and supportive at all times. We believe in the growth mindset and in empowering you with new skills and confidence in your abilities. If at any time you feel that a student, TA, or professor is deviating from these guidelines, please reach out to us so that we may address the situation as quickly as possible.

6. Assignments and Participation

There are two grading schemas, depending on whether you participate in the extra credit activity.

If you do **not** participate in the extra credit activity, you will be graded as follows:

Homework	40%
Midterm exam	30%
Final exam	30%

If you **do** participate in the extra credit activity, you will be graded as follows:

Homework	36.3%
Midterm exam	27.3%
Final exam	27.3%
Extra credit	9.1%

Homework is assigned in your discussion section (or Bruinlearn) and is due at the next discussion section (or date specified on Bruinlearn). Late homework is not accepted. There are typically eight homework assignments distributed throughout the quarter. We do not offer make-ups, however, the two lowest grades on your homework assignments will automatically be dropped and will not count towards your final grade. Homework is intended to reinforce the learning goals, e.g., improve your quantitative reasoning skills.

The midterm and final exams are typically multiple choice exams with typically 40 questions offered either in class or on Bruinlearn. The exams are intended to assess your knowledge of the material, with a focus on important facts, concepts, and processes as opposed to unimportant factoids.

The optional extra credit category can be fulfilled by visiting one of the following museums:

- 1) La Brea Tar Pits (student ticket \$12) <http://www.tarpits.org/>
- 2) Natural History Museum (student ticket \$12) <http://www.nhm.org>
- 3) California Science Center (free) <http://www.californiasciencecenter.org/>
- 4) Griffith Observatory (free) <http://www.griffithobservatory.org>
- 5) Mount Wilson (\$15 guided tour) <https://www.mtwilson.edu/>



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Visiting a museum for extra credit is a fun, voluntary activity that requires submission of a waiver of liability per university policy. You are not allowed to participate in the activity or earn extra credit unless the waiver is dated, signed, and submitted in advance of your museum visit in the Extra Credit Assignment folder on Bruinlearn. Bruinlearn will timestamp your submissions, and we recommend submitting the waiver no later than the day before your visit.

Documentation for extra credit consists of (1) two time-stamped digital photographs: one of you inside the museum, and one of a museum item (e.g., object, specimen, instrument) that you found interesting; (2) a text file providing a sentence or two describing this item.

7. Course Grading Scale

We grade on the basis of competencies, not competition. Your letter grade will be determined by your overall final numerical grade. We will use the table to the right or a more generous version of this table to assign letter grades. There are no quotas: if everyone scores 95%, everyone gets an A+.

Letter grade	Percentage
A+	95%–100%
A	93%–94%
A-	90%–92%
B+	87%–89%
B	83%–86%
B-	80%–82%
C+	77%–79%
C	73%–76%
C-	70%–72%
D+	67%–69%
D	63%–66%
D-	60%–62%
F	0–59%

8. Courses and GE Credits

This course is a 4-credit course without a lab component.

GE Credit Acknowledgment: Upon successful completion of this course, students will satisfy the General Education requirement in the area of “Foundations of Scientific Inquiry in Physical Science” for the College of Letters and Science.

9. Academic Accommodations

Students needing academic accommodations based on a disability should contact the [Center for Accessible Education](#) (CAE) at Murphy Hall A255 (310-825-1501). Students should contact CAE as soon as possible since reasonable notice is needed to coordinate accommodations.

10. Course Schedule

Readings are chapters from Catling’s “Astrobiology: A Very Short Introduction”.

Number Date Instructor	Title	Themes / Objectives	Reading
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Lecture 1 Mon Oct. 2 ALL	Astrobiology	• Course policies • Course outline • What is life?	1
Lecture 2 Wed Oct. 4 JLM	The Universal Context of Life	• Scale of the universe • Forces of nature • Formation of elements	2
Lecture 3 Mon Oct. 9 JLM	A Universe of Matter and Energy	• Matter • Energy • Light	2
Lecture 4 Wed Oct. 11 JLM	Building a Habitable Planet	• Scientific method • Conservation principles • Formation of planets	2
Lecture 5 Mon Oct. 16 JLM	The Nature and Evolution of Habitability	• Habitable zone • Climate change • Information literacy	4, 6
Lecture 6 Wed Oct. 18 TT	The Origin of Life on Earth	• A • B • C	3-5
Lecture 7 Mon Oct. 17 TT	The Origin of Life on Earth	• A • B • C	3-5
Lecture 8 Wed Oct. 19 TT	Fossils of Primitive Life Forms on Earth	• A • B • C	3
		•	
		•	
Lecture 9 Mon Oct. 24 TT	The Evolution & Extinction of Life on Earth	• A • B • C	4, 5
Wed Oct. 26	Midterm exam (Lectures 1-9)		
Lecture 10 Mon Oct. 31 TT	Limits of Life	• A • B • C	3, 5
Lecture 11 Wed Nov. 2 TT	Extremophiles on Earth	• A • B • C	3, 5
Lecture 12 Mon Nov. 7 TT	The Search for Life beyond Earth	• A • B • C	1, 3

Lecture 13 Wed Nov. 9 TT	Mars	• A • B • C	6
Lecture 14 Mon Nov. 14 TT	Titan	• A • B • C	6
Lecture 15 Wed Nov. 16 JLM	Europa and Enceladus	• The Jovian planets • Tides • Resonances	6
Lecture 16 Mon Nov. 21 JLM	Exoplanets	• Detection methods • The Kepler revolution • Biosignatures	7
Wed Nov. 23	No class (Thanksgiving)		
Lecture 17 Mon Nov. 28 JLM	The Search for Extraterrestrial Intelligence	• Technosignatures • Pros and cons of SETI • SETI at UCLA	7
Lecture 18 Wed Nov. 30 JLM	Interstellar Travel	• Theory of relativity • UFOs/UAPs • Critical thinking	7
TBD	Final exam (Lectures 10-18)		

11. Other Campus Resources

Academic Counseling

Academic Advisors aim to collaborate with you to support your academic, professional, and personal development. We encourage you to contact your academic advisor early and often to ensure your success during your first year.

Website: <https://www.registrar.ucla.edu/Academics/Academic-Counseling>

Counseling and Psychological Services (CAPS)

CAPS provides counseling services to students who are in need of support in any way 24 hours a day, 7 days a week. Appointment can be made by contacting CAPS during their office hours Monday - Friday 9 am - 4 pm. Crisis support is available 24/7 by phone at 310-825-0768.

Website: www.counseling.ucla.edu

Phone Number: 310-825-0768

Campus Location: John Wooden Center, 221 Westwood Plaza

Title IX Office

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the CARE Advocacy Office for Sexual and Gender-Based Violence, 1st Floor Wooden Center West, CAREadvocate@careprogram.ucla.edu, 310.206.2465. You can also report sexual violence or



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sexual harassment directly to the University's Title IX Coordinator, 2241 Murphy Hall, titleix@conet.ucla.edu, 310.206.3417. Reports to law enforcement can be made to UCPD at 310.825.1491.

12. Academic Integrity

Academic integrity is expected at all times and violations will be reported to the Dean of students. Collaboration between students is never permitted except when explicitly allowed by your instructor. Website: <https://deanofstudents.ucla.edu/academic-integrity>