

Astronomy 309L: Search for Extraterrestrial Life

Fall 2019, Unique Number: 46010

MWF 1pm, PAI 3.02

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W 4:30-5:30pm, Th 5-6pm

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Office hours:

W 3:30-4:30pm, F 3:30-4:30pm

Prerequisites: This course requires prior knowledge of astronomy at the **AST 301 or AST 307 level** (introductory astronomy). It is a very interdisciplinary course and also requires a high school level of general science, including biology and geology. This course will include work designed to develop skills in critical thinking, communication, quantitative analysis, and teamwork. Communication in the course will include student questions and subsequent classroom discussions during lecture. Teamwork in the course may consist of working in small groups during help sessions and instructor-modeled problem solving that is guided by student decisions and group feedback.

Class Website: This course will be primarily run through the Canvas system, at canvas.utexas.edu. All class communication will be done through Canvas. You are responsible for checking Canvas daily. I recommend setting up email alerts to be notified when I send messages or post assignments. You may also wish to download the mobile app.

Course-Level Learning Goals: At the end of the course, you are expected to be able to:

1. Evaluate how life might be found outside Earth, and the likelihood of such a discovery in your lifetime.
2. Read popular science articles & watch science fiction movies about extraterrestrial life and evaluate/analyze their plausibility
3. Describe the history of life on Earth
4. Describe the hunt for life on planets/moons in the solar system; evaluate each planet in the solar system based on the likelihood that life could survive there
5. Describe current discoveries in exoplanets and understand how life is likely to be found there

Course Description: This is an interdisciplinary course in the Astronomy Department that will examine the science behind the search for life in the universe. We will touch on everything from life as we know it on Earth, to the search for life in the solar system, to recent discoveries of exoplanets and the search for life outside the solar system.

Required Texts and Other Items: You are required to have (in paper or e-book form) the textbook *Life in the Universe* 4th edition. (There are a number of changes in the 4th edition, so please make sure you have the right one). You are also expected to have purchased an access code for the Modified Mastering Astronomy online software, where all homework will be completed and turned in. These are conveniently sold as a bundle.

Bring to Class:

A device that can connect to UT Instapoll

Pen or pencil for in-class activities/worksheets

Class Structure: This class will not be a traditional University lecture course. It will combine short lectures with discussions and group activities. You will only learn if you participate in class activities, thus attendance and participation is *required*. You must bring a device that can access Canvas to class in order to get participation credit via UT Instapoll (e.g., phone with Canvas app). Do not pack up or leave class early unless you have talked to me in advance, as a consideration to both me and your fellow students. Similarly do not arrive late unless you have consulted with me in advance.

Use of electronics: Students using their electronics for non-class activities are a distraction to those around them. If we find your use of electronics a problem and a distraction to others, we will ask you to leave the classroom, not earning participation credit for that day. Also, if you are distracted by non-academic use of electronics by a fellow student, you can ask them directly to stop or notify the instructor or TA who will follow-up.

Communication: Your first point of contact for communication is your TA (Last names A—L: Melanie Rowland; last names M—Z: Andy Lam). Please use Canvas to send a message your TA with questions, concerns, etc. They will aim to respond during normal working hours (M-F, 9-5pm) within 24 hours. If your question is urgent, private, or you haven't heard from your TA, please message Prof. Morley.

Grading Components and Policies:

You will receive the grade you earn. There will be **no extra credit** awarded after the semester, so please be sure to put in the effort throughout the semester to earn the grade you want.

The composition of the course grade is:

- Exams = 30% (four exams at 7.5% each – no drops)
- Online homework = 25% (drop three lowest scores)
- In-class participation = 25% (graded using UT Instapoll, drop four lowest scores)
- Course-long Science Communication Project = 20% (no drops)

This class will not be graded on a curve. The average percentage in each of these grade components will be weighted by the above percentages to derive the final course grade, which will be assigned as follows (where the numbers represent the percentage of total points). There is no rounding and no extra credit. Emails to me at the end of the semester asking about either will be referred to this syllabus.

93.00—100% = A	80.00 — 82.99% = B-	67.00 — 69.99% = D+
90.00 — 92.99% = A-	77.00 — 79.99% = C+	63.00 — 66.99% = D
87.00 — 89.99% = B+	73.00 — 76.99% = C	60.00 — 62.99% = D-
83.00 — 86.99% = B	70.00 — 72.99% = C-	0 — 59.99% = F

Exams: There will be four in-class exams, which will be a mix of multiple choice and short-answer questions. Exams will closely match material covered during in-class activities, including Instapoll questions and activities. Your exams will be on September 20, October 18, November 6, and December 9th. There will be no final exam. There are no dropped exam grades, and no makeup exams. SSD students needing testing accommodations must contact their TA a week in advance, and we must have an SSD letter on record.

If an emergency or personal event occurs which causes you to miss one of the exams, and you contact me prior to the start of the exam, I will work with you to schedule a makeup. If you are on official university travel, I will arrange with you to take the exam before or after your trip.

Final Science Communication Project: In October, I will distribute an assignment that you will work on during the rest of the semester. The due dates and an accompanying guideline/ rubric for evaluation will be distributed at that time. The objective of this science communication (“scicomm”) project is to get you thinking about not just learning material, but teaching it, and communicating it effectively to a non-specialist audience. You will be taking scientific concept(s) from class and preparing a creative piece around those concepts that can easily be understood by friends and family. You can choose the medium/genre you want to work with, either written or non-written (podcast, video, infographic, etc.). For example, you could choose to produce illustrated magazine-style articles, short science fiction stories, podcasts, recorded presentations, a video, or animations. You will be required to sketch this out well in advance of the deadline and present a proposal for your project to the instructor and TAs. You are encouraged to work in groups of 2—5 students.

Homework: Homework will be composed of online modules on Modified Mastering Astronomy, accessed through the Canvas website. These will be due 5 min before the start of class on Fridays. Your **three lowest homework grades will be dropped**. Any missed homeworks beyond those three will count as a zero. **There is no late work accepted**. Again in the case of an emergency, if you contact me prior to the missed assignments due date, I will work with you.

In-Class Participation: In-class activities play a big role in this class, and your participation is required. You will receive your participation credit by participating in the online question system on Canvas, which can be accessed on your cell phone. If you don’t have access to a device to participate, please discuss this with me and we’ll find a solution. If you need to arrive late or leave early for an excused reason, please contact me prior to class. Although makeup participation points will not be allowed, I realize that students may need to occasionally miss class (for illness, family events, etc.). For this reason, the four lowest in-class participation scores will be dropped. Students who have excused absences as part of a university sponsored event are required to come talk to me in well in advance of the absence.

Accommodations for disabilities and/or family responsibilities: If you have any kind of disability, whether apparent or non-apparent, learning, emotional, physical, or cognitive, and you need some accommodations or alternatives to lectures, assignments, or exams, please feel free to contact me to discuss reasonable accommodations for your access needs. Students with disabilities may also request appropriate accommodations from the Division of Diversity and Community Engagement, and from UT’s Services for Students with Disabilities. The official wording provided by the university is: The University of Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-6441 TTY or Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, www.utexas.edu/diversity/ddce/ssd.

Aside from disabilities, I recognize that students with children or family care responsibilities might require special accommodations on occasion, and they should contact me by email regarding missed or late work.

Regarding harassment/assault: Harassment of any sort will not be tolerated in this classroom or related workspaces. Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights violations subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you

know has been harassed or assaulted, you can find the appropriate resources through the University Title IX Coordinator (512-232-3992), UT Austin Campus Police (512-471-4441), the Student Ombuds Services (which can provide *confidential* advice, resources and help; 512-471-3825), and the UT Counseling and Mental Health Center (512-471-3515).

Academic Dishonesty: The minimum penalty for cheating — in any way whatsoever — is receiving a zero on the assignment on which you cheated. I reserve the right to seek a penalty I deem appropriate for the given case of academic dishonesty, including failing the class and being reported to Student Judicial Services. In this class, in addition to all the traditional types of cheating (plagiarism, looking at someone else's answer, utilizing "cheat sheets" of any form or fashion either paper or digitized, getting an advance copy of an assessment), we also consider allowing someone else to use your Mastering Astronomy account cheating. If the academic honesty is sufficiently serious, I will proceed by filing a formal report to the Judicial Services in the Dean of Students Office as is policy. Judicial Services would decide the final penalty after a hearing on the matter. For more information, read in the General Information Catalog about scholastic dishonesty (i.e. cheating).

Course Schedule

Day	Topic
Aug 28	Introduction, Logistics, Overview of Life in the Universe
Aug 30	Chapter 2: What science is, and Kepler's Laws
Sep 4	Chapter 2: What science is, and Kepler's Laws
Sep 6	Chapter 3: A review of everything in AST 301/307 you need for this course
Sep 9	Chapter 3: A review of everything in AST 301/307 you need for this course
Sep 11	Chapter 3: A review of everything in AST 301/307 you need for this course
Sep 13	Chapter 4: A crash course in all the geology you need for this course
Sep 16	Chapter 4: A crash course in all the geology you need for this course
Sep 18	Chapter 4: A crash course in all the geology you need for this course
Sep 20	Exam #1: Astronomy and Geology for AST 309L
Sep 23	Chapter 5: Nature of Life on Earth
Sep 25	Chapter 5: Nature of Life on Earth
Sep 27	Chapter 6: Origin and Evolution of Life on Earth
Sep 30	Chapter 6: Origin and Evolution of Life on Earth
Oct 2	Chapter 6: Origin and Evolution of Life on Earth
Oct 4	Chapter 7: Search for Life in the Solar System
Oct 7	Chapter 7: Search for Life in the Solar System
Oct 9	Chapter 7: Search for Life in the Solar System
Oct 11	Chapter 8: Mars
Oct 14	Chapter 8: Mars
Oct 16	Chapter 8: Martians in the media
Oct 18	Exam #2: Biology and the search for life on Mars

Day	Topic
Oct 21	Chapter 9: Jovian Moons
Oct 23	Chapter 9: Jovian Moons
Oct 25	Chapter 9: Jovian Moons
Oct 28	Chapter 10: Nature and Evolution of Habitability
Oct 30	Chapter 10: Nature and Evolution of Habitability
Nov 1	Chapter 11: Exoplanets
Nov 4	Chapter 11: Exoplanets
Nov 6	Exam #3: Jovian Moons and exoplanets part 1
Nov 8	Chapter 11: Exoplanets
Nov 11	Chapter 11: Exoplanets
Nov 13	Chapter 11: Exoplanets
Nov 15	Chapter 11: Exoplanets
Nov 18	Chapter 12: Search for Extraterrestrial Intelligence
Nov 20	Chapter 12: Search for Extraterrestrial Intelligence
Nov 22	Chapter 12: Search for Extraterrestrial Intelligence
Nov 25	Chapter 13: Interstellar Travel & the Fermi Paradox
Nov 27-29	Thanksgiving break
Dec 2	Chapter 13: Interstellar Travel & the Fermi Paradox
Dec 4	Final Project due , Chapter 13: Interstellar Travel & the Fermi Paradox
Dec 6	Aliens in Literature and Media
Dec 9	Exam #4: The hunt for life outside the solar system