Astronomy 309L: Search for Extraterrestrial Life

Spring 2019
Unique Number: 46600
TTh 2-3:30pm, Welch 2.110

Professor:
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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 **Mastering Astronomy online software**, where all homework will be completed and turned in. These are conveniently sold as a bundle.

Bring to Class:
At least one dry-erase marker
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. **Due to the structure of this class space, laptop use is strongly discouraged unless you require it for accommodations or consult with me privately about your needs**.

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% (three exams at 10% each – no drops)
- Online homework = 25% (drop three lowest scores)
- In-class participation = 25% (graded using UT Instapoll, drop three 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 three in-class multiple choice exams. The first will be on Feb 26, and will cover everything up to that point. The second will be on April 4 and will cover material between the first exam and that point. The third will be on the last class day May 9, and will cover all material between the second exam and that point. There will be no final exam. There are no drop exams, and no makeup exams.

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 February, 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 TA. You are encouraged to work in pairs

of your choosing; if working in pairs, you will be required to document the work that each individual did and separate grades may be given.

Homework: Homework will be composed of online modules on Mastering Astronomy. These will typically be assigned to be completed before every class. They will be due 5 min before the start of class (1:55pm on Tuesdays and Thursdays). 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. The course ID for this course for Mastering Astronomy is **`AST309LSPRING2019`**. You will need this when you sign up.

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 allowed, I realize that students may need to occasionally miss class. For this reason, the three 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 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 (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).

Drop date: The last day to drop the class is January 25th. This will require you to go to your college and get a drop form. You then must bring the form to me and get my approval and signature. After this deadline, students must go to the Dean's office, WCH 2.112, to begin the appeal for substantiated non-academic reasons.

Course Schedule

Day	Topic
Jan 22	Introduction, Logistics, Overview of Life in the Universe
Jan 24	Chapter 2: What science is, and Kepler’s Laws
Jan 29	Chapter 3: A review of everything in AST 301/307 you need for this course
Jan 31	Chapter 3: A review of everything in AST 301/307 you need for this course
Feb 5	Chapter 4: A crash course in all the geology you need for this course
Feb 7	Chapter 4: A crash course in all the geology you need for this course
Feb 12	Chapter 5: Nature of Life on Earth
Feb 14	Chapter 5: Nature of Life on Earth
Feb 19	Chapter 6: Origin and Evolution of Life on Earth

Day	Topic
Feb 21	Chapter 6: Origin and Evolution of Life on Earth
Feb 26	Exam #1: Astronomy, Geology, Planetary Science, Biology, and Life on Earth
Feb 28	Chapter 7: Search for Life in the Solar System
March 5	Chapter 7: Search for Life in the Solar System
March 7	Chapter 8: Mars
March 12	Chapter 8: Mars
March 14	Chapter 9: Jovian Moons
	(spring break from March 18-March 22)
March 26	Chapter 9: Jovian Moons
March 28	Chapter 10: Nature and Evolution of Habitability
April 2	Chapter 10: Nature and Evolution of Habitability
April 4	Exam #2: The hunt for life in the solar system
April 9	Chapter 11: Exoplanets
April 11	Chapter 11: Exoplanets
April 16	Chapter 11: Exoplanets
April 18	Chapter 11: Exoplanets
April 23	Chapter 12: Search for Extraterrestrial Intelligence
April 25	Chapter 12: Search for Extraterrestrial Intelligence
April 30	Chapter 13: Interstellar Travel & the Fermi Paradox
May 2	**Final Project due**, Chapter 13: Interstellar Travel & the Fermi Paradox
May 7	Exam review and Aliens in Literature and Media
May 9	Exam #3: The hunt for life outside the solar system