General Education

PTYS/GEOS/ASTR 214 | Life in the Cosmos

Building Connections | Quantitative Reasoning & World Cultures/Societies
Kuiper 308 | T/Th 9:30—10:45
Web: https://d2l.arizona.edu/d2l/home/1408159
Instructor: Prof. Tyler Robinson | he/him | tdrobin@arizona.edu
Assistant: Kiana McFadden | she/her | kmcfadden@arizona.edu
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Introduction

Welcome to Life in the Cosmos! The detailed syllabus below contains everything a student might need to know about curriculum, course information, grading, and course policies.

Part 1: Course Curriculum

1.1 Course Description

Life in the Cosmos explores key questions in astrobiology and planetary science about the origin and evolution of life on Earth and the possibility that such phenomena have arisen elsewhere in the Universe. We examine what it means for a planet to be alive at scales ranging from cellular processes up to global impacts of biological activity. We consider space-exploration activities to search for life within the Solar System, throughout our Galaxy, and beyond from various cultural perspectives.

1.2 Expected Students Learning Outcomes

Student Learning Outcomes

- The ability to utilize multiple perspectives and make meaningful connections across disciplines and social positions, think conceptually and critically, and solve problems.
- Competency in working with numerical information by critically analyzing quantitative information, generating ideas that are supported by quantitative evidence, assessing the relevance of data and its associated implications in a variety of contexts, and communicating those ideas and/or associated interpretations using various formats (graphs, data tables, illustrations, videos, or written reflections).
- Understanding of the values, practices, and/or cultural products of at least one non-US culture/society with an astrobiology or space exploration program; relate how these values, practices and/or cultural products have shaped their space exploration activities; and reflect on how the student's own background has influenced their perceptions of other societies and their sense of place in the global community.

Course Objectives

- Identify and interrelate the wide variety of disciplines that address the fundamental questions:
    - Where did we come from?

    - What is the meaning of life?
    - Are we alone in the universe?
- Communicate and justify how interdisciplinary approaches contribute to understanding the origin and history of life on Earth.
- Use core values, concepts, theories, and quantitative methods from planetary science and biology to identify promising targets in the search for extraterrestrial life.
- Examine the role and importance of astrobiology from various perspectives.
- Engage in critical and conceptual thinking about the impact of discovering life on another planet.

1.3 Course Assessment Plan

Learning Opportunities

Assessments include low-impact in-class quizzes and scaffolded group-produced Signature Assignments focused on reading and analyzing an astrobiology-focused science fiction novel.

Signature Assignment

Life in the Cosmos includes two semester-long, group-produced Signature Assignments. After reading an astrobiology-focused science fiction novel, small groups will produce (1) a research poster analyzing scientific concepts from the novel as well as (2) a brief essay discussing cultural elements of the novel.

Final Examination

Life in the Cosmos has **no** final examination.

Honors Credit

Honors credit is available through an Honors contract. If interested, please contact Prof. Robinson.

1.4 Scheduled Topics/Activities

Week	Dates	Topic
1	Jan 11	Course Introduction
2	Jan 16 – Jan 18	What is Astrobiology? (Read: p. 1–13)
3	Jan 23 – Jan 25	From Big Bang to Stars (Read: p. 14–22)
4	Jan 30 – Feb 01	Stars and Formation of Stars and Planets (Read: p. 22–27)
5	Feb 06 – Feb 08	Origin of Life and Early Earth (Read: p. 28–43)
6	Feb 13 – Feb 15	Co-Evolution of Life and Earth (Read: p. 43–63)
7	Feb 20 – Feb 22	Distribution and Structure of Life on Earth (Read: p. 63–75)
8	Feb 27 – Mar 01	Life on Earth and Extremophiles (Read: p. 75–81)
9	Mar 06 – Mar 08	Spring Break (No Class)
10	Mar 13 – Mar 15	Habitability & Life in the Solar System: Part I (Read: p. 82–88)
11	Mar 20 – Mar 22	Habitability & Life in the Solar System: Part II (Read: p. 99–109)
12	Mar 27 – Mar 29	Life on Mars: Past, Present, Future Prospects (Read: p. 88–99)
13	Apr 03 – Apr 05	Habitability Outside the Solar System (Read: p. 110–119)
14	Apr 10 – Apr 12	Final Project Group Work (No Class)
15	Apr 17 – Apr 19	Space Exploration & Policy (Read: p. 120–123)
16	Apr 24 – Apr 26	Interstellar Travel; Fermi Paradox; SETI (Read: p. 123–129)
17	Apr 30	In-Class Final Project Assistance

Week	Activity or Due
3	Small Groups Assembled (in class)
5	Sci-Fi Book Justification Due (end of week)
10	Mid-Semester Peer Grades (online)
13	Sci-Fi Book Scientific Analysis Poster *Draft* Due (end of week)
17	Sci-Fi Book Scientific Analysis Poster Due (end of week)
17	Sci-Fi Book Cultural Analysis Essay Due (end of week)
17	End-Semester Peer Grades (online)

Part 2: Course Information

2.1 Instructor(s) and Course Sites

Instructor: Prof. Tyler Robinson | Kuiper 417 | tdrobin@arizona.edu
Office Hours: T/Th 11:00—12:00; appointment and/or "open door"
Teaching Assistant: Kiana McFadden | kmcfadden@arizona.edu
Office Hours: M 11:30—12:30 in Kuiper 301
Teaching Assistant: Sam Myers | sammyers@arizona.edu
Office Hours: Th 11:30—12:30 in Kuiper 334
Teaching Assistant: Zoë Wilbur | zewilbur@arizona.edu
Office Hours: Upon request

2.2 Course Communications

Course-wide communications will be weekly through D2L announcements and associated emails to official UA addresses. Students are welcome to email the instructor with any/all course-related questions or comments and should expect a response within about one working day.

2.3 Course Format and Session Structure

Life in the Universe is an in-person, lecture-driven, three credit hour course. Students also engage in online discussions, weekly readings, and small group projects. Lectures incorporate Kahoot! quizzes to encourage readings as well as a once-weekly, low-impact quiz to check student comprehension.

2.4 Required Resources and Equipment

The required textbook, which is freely available to all enrolled students through the course D2L site, is:

Catling, D.C. (2013) *Astrobiology: A Very Short Introduction*, Oxford U. Press

2.5 Student Success Resources

Please note the following resources and support services:

- UA Academic policies and procedures
- Student Assistance and Advocacy information
- Counseling and Psych Services (CAPS)
- Other student support resources

Part 3: Course Policies

3.1 Progress and Completion Policies

Late Enrollment

Students who register after the first-class meeting may make up missed assignments within one week of joining the class.

Absence and Class Participation

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance and in-class participation are incorporated into a student's grade. However, students can have several absences and still achieve a perfect participation score, thereby minimizing the stress of missing a lecture.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at https://catalog.arizona.edu/policy/class-attendance-and-participation. The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: http://policy.arizona.edu/human-resources/religious- accommodation-policy. Absences preapproved by the UA Dean of Students (or dean's designee) will be honored. See http://policy.arizona.edu/employmenthuman-resources/attendance.

Late Submissions

Late submissions are not accepted, excepting extenuating circumstances.

Grading

Grades are assigned based on accumulated points throughout the semester. Course items and associated points are:

Item	Maximum Points
Participation	50
In-Class Quizzes	10
Peer Grades	5
Sci-Fi Book Justification (*group*)	5
Sci-Fi Book Analysis Drafts (*group*)	5
Sci-Fi Book Cultural Analysis (*group*)	15
Sci-Fi Book Scientific Analysis Poster (*group*)	10
Total	100

Letter grades then follow:

A: $\geq$ 90 pts
B: $\geq$ 80 pts and $<$ 90 pts
C: $\geq$ 70 pts and $<$ 80 pts
D: $\geq$ 60 pts and $<$ 70 pts
F: $<$ 60 pts

Participation: Students will have many avenues to achieve success in participation; attendance, in-class Kahoot! quizzes, in-class questions/answers, on-line discussion, and visits to office hours all award a student with participation points. Attendance at a twice-weekly lecture earns a point, performance on a daily Kahoot! quiz earns up to one point, asking a question or responding to a prompt in lecture earns a point (up to one point per lecture), participating in a weekly on-line discussion with a thoughtful, paragraph-long entry or relevant shared article earns a point, and two visits to office hours to chat about course content yields up to five points. Participation points are awarded up to a *maximum of 50 total points*. The total number of available points are then:

Participation Item	Available Points
Attendance (daily)	28
In-class Kahoot Quiz (daily)	28
In-class Question or Answer (daily)	28
Online Discussion (weekly)	17
Office Hours Visit (2x per semester)	5
Total	106

In-Class Quizzes: Brief, low-impact quizzes will be administered every Thursday in all 15 weeks of the semester. Each quiz has a maximum possible score of one point. Quiz points are totaled over the semester to a *maximum of 10 total points*.

Peer Grades: Group work can be challenging but is also an important skill to learn for use throughout our lives. To best enable the strong functioning of small-groups, group members will evaluate one another at the middle and end of the semester. Each assessment is worth 2.5 points and the end-semester average group-assigned grade for each student is used to weight their grade for all group-submitted items.

Sci-Fi Book Justification: Working in small groups, students will select a science fiction book to read and analyze over the course of the semester. A one-page justification of the appropriateness of the selected book (submitted as a group) is worth five points. This is an opportunity to receive feedback on ideas, especially with regards to how material in the group-read book connects to cultural themes in Origins, Exploration, and Discovery.

Poster Draft: One Signature Assignment for this course is a poster that provides a scientific analysis (that is quantitative, where feasible) of the astrobiological topics encountered in the group-read science fiction book. Midway through the poster design process, small groups will submit a poster draft for feedback. This draft is not formally graded and its submission awards five points.

Sci-Fi Book Cultural Analysis: As described above, another Signature Assignment for this course centers on the cultural analysis of the group-read science fiction book. Selected books must include at least one of the following themes: (1) Origins, (2) Exploration, and (3) Discovery. The cultural analysis assignment then connects any of these book themes to any of: (1) diverse cultural views on life's origins, (2) diverse cultural views on exploration or multi-national efforts in space exploration, and (3) historical analysis on the cultural impacts of major new discoveries. A total of 15 points is available for this assignment.

Sci-Fi Book Scientific Analysis Poster: As described above, small groups will submit a Signature Assignment

in the form of a stylistic poster that provides a scientific analysis of the astrobiological themes present in the group-read science fiction book. A total of 10 points is available for this assignment.

Extra Credit: Show your creative side! Students can be awarded up to a total of five (5) additional points for any form of artistic creation inspired by the theme: "life in *our* Universe." Write a poem about water on Mars, decorate a cake that depicts an origin story from another culture, paint a watercolor piece about the tree of life—it all counts! Points will be awarded based on roughly-perceived efforts, broadly following: short poem (1 pt); poem or short story or sketch (2 pt); small decorated baked goods (3 pt); longer-format story or large decorated baked good (4 pt) musical piece or animation or play or video (5 pt). Pieces may be shared with the larger class, with permission. Students may ask the instructor in advance for the anticipated number of points for a proposed artistic piece.

Class-wide extra credit will also be given for completing the end-of-semester course evaluations. If 50% of all students submit responses, the entire class receives one (1) point of extra credit. If 80% of all students submit responses, then the class-wide extra credit will be increased to two (2) total points.

Requests for Incomplete (I) or Withdrawal (W)

Requests for an Incomplete or Withdrawal must be made in accordance with University policies, which are available at http://catalog.arizona.edu/policy/grades-and-grading- system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading- system#Withdrawal, respectively.

Dispute of Grade Policy

Grade disputes must be brought to the attention of the instructor within one week of return.

3.2 Classroom Climate and Community Engagement

UA Policies and Student Resources

All UA courses adhere to the general UA Policies as stated on the institutional websites: https://catalog.arizona.edu/policies. Please make yourself familiar with the Student Code of Academic Integrity and the protocol ensuring non-discriminatory, anti-harassment, non-threatening learning experiences.

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, **https://drc.arizona.edu/)** to establish reasonable accommodations.

Course Climate and Inclusion Statement

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity may be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Community Engagement

The instructor expects students to (1) be attentive and engaged during lectures, (2) be courteous, and (3) submit work on time. Students may expect that the instructor is (1) always engaged during lecture, (2) kind and courteous to all students, (3) keeps students informed of upcoming deadlines, and (4) returns graded work in a timely matter. Especially when working in small groups, students should expect their peers to (1) be engaged, (2) be open-minded, (3) be respectful, and (4) be attentive to deadlines and workloads. Students shall not work together on assignments that are not small group-focused (e.g., students cannot collaborate on in-class quizzes).

Use of Devices for Learning

Use of electronic devices for learning is encouraged in the classroom. Students choosing to use such devices must be mindful of any learning distractions these devices might make. If a device is found to be distracting to others, the instructor may ask the device owner to change seats, disable the device, and/or leave the classroom.

Confidentiality of Student Records

Student records are kept confidential as per FERPA policy.

Anonymous Feedback

Feedback is welcome at any time and can be given anonymously at www.bit.ly/2wR1aU6.

Subject to Change Statement

The information contained in this course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.