

Syllabus – ASTR/PTYS 475/575

Semester and Year this Document Covers

Fall 2026

Course Number and Title

Astronomy 475/575 – Planetary Science 475/575: Planetary Astrobiology

Instructor Information

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Teaching Assistant Information

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Course Description

This course will explore the processes related to planet formation, the properties of planets and the planetary conditions required for the emergence of life. We will study the formation of our Solar System and exoplanetary systems, the distribution and properties of exoplanets, and the potential habitability of other planets/moons in our system or extrasolar systems. The course will also review science cases and possible future astrobiology studies, both in site and via remote sensing, of astrobiologically relevant environments. We anticipate a few guest lectures will highlight astrobiology-related work at UA.

Course Prerequisites or Co-requisites

MATH 122B or MATH 125 – Calculus I (or above)

PHYS 102 – Introductory Mechanics (or above)

Completion of completion of at least two major-level courses in physics, chemistry, biology, planetary science, geoscience, or astronomy is strongly recommended. The UA Competency Requirements (<https://www.arizona.edu/admissions/resources/high-school-competency>) are assumed.

Course Format and Teaching Methods

Course Modality: **Live in person.**

Teaching methods: The class will mostly consist of lectures, delivered in-person. In addition, students will be assigned relevant, seminal papers, which they will read and report on. The class will also involve a collaborative group project in which students will solve a more challenging problem and submit a report on it.

Course Location & Timings

Tuesdays and Thursdays 11:00 AM – 12:15 PM, Kuiper Space Sciences Room 312

Course Objectives

The objective of the course is to introduce students to the goals, state of the art, and methods of astrobiological research and relevant scientific and methodological context.

Expected Learning Outcomes

- 1) Students will understand the goals, scope, and key principles behind astrobiology.
- 2) Students will learn to the fundamental physical basis of habitable environments.

- 3) Students will understand how planets form and what processes determine their atmospheric properties and climate.
- 4) Students will learn quantitative methods to search for and characterize extrasolar planets.
- 5) Students will develop an understanding of potential habitats in the Solar System.
- 6) Students will familiarize themselves with research methods typical to astrobiology, including research literature.
- 7) *Graduate students only:* Students will learn to give journal-club style talks on academic papers.

400/500 Co-convened Course Information

This is a co-convened course. Although the scope of the material covered in the course is the same for undergraduate and graduate students, graduate students are expected to develop and demonstrate a deeper quantitative understanding of the problems discussed. Graduate students will complete additional, more complex homework problems and will have additional questions in the final exam.

Required Texts and Materials

There is no required book for this course. For those who would like some additional reading material, we recommend the below-listed textbooks, which are available freely online via the UA Library. We will also assign several journal articles as reading material.

- Cockell (2015) "Astrobiology: Understanding Life in the Universe". Available online via UA Libraries: https://arizona-primo.hosted.exlibrisgroup.com/permalink/f/6ljah/01UA_ALMA51853318030003843
- de Pater & Lissauer (2014) "Planetary Sciences". Available online via UA Libraries: https://arizona-primo.hosted.exlibrisgroup.com/permalink/f/1h28lag/TN_cdi_askewsholts_vlebooks_9781316191958
- Catling & Kasting (2017) "Atmospheric Evolution on Inhabited and Lifeless Worlds". Available online via UA libraries: https://arizona-primo.hosted.exlibrisgroup.com/permalink/f/1h28lag/TN_cdi_askewsholts_vlebooks_9781316825488

Schedule of Topics and Activities

For the up-to-date weekly schedule and activities, please refer to the class's D2L page and, in it, the "Course Organization" folder. Assignments will list their due dates. Late work will receive 50% of credit if submitted ≤ 1 week after the deadline, and 0% credit thereafter. Extensions may be requested by consultation with the instructor. Students are strongly advised to consult with the instructor for any challenges encountered relevant to the class. Flexibility is possible, but only if you talk to us!

Assessments

Assessment Categories	Percentage of final grade
Homework (3)	30%
Seminal Paper Reviews (Undergraduate): 2 written summaries, 15% each	30%
Seminal Paper Reviews (Graduate): 2 written summaries, 1 presentation, 10% each	
Group project	30%
Final Exam	10%
Total	100%

Final Examination or Project

The class will include a final group project. Students will form groups (3-4 students in each group) to tackle a more challenging problem.

The class will include a final exam.

Grading Scale and Policies

Grades may be adjusted to reflect overall class performance, but as a general rule letter grades will correspond to number grades as follows:

A >90%

B	80%-90%
C	70%-80%
D	60%-70%
E	<60%

Safety on Campus and in the Classroom

For a list of emergency procedures for all types of incidents, please visit the website of the Critical Incident Response Team (CIRT): <https://cirt.arizona.edu/case-emergency/overview>

Also watch the video available at

https://arizona.sabacloud.com/Saba/Web_spf/NA7P1PRD161/common/learningeventdetail/crtfy00000000003560

Nondiscrimination and Anti-harassment Policy

The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please see:

<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

University Policies

All university policies related to a syllabus are available at: <https://catalog.arizona.edu/syllabus-policies>.

Subject to Change Notice

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

Student Resources

University of Arizona's Basic Needs Resources page: <http://basicneeds.arizona.edu/index.html>

Collaboration Policy

Teamwork is a key skill in science, and students are permitted to collaborate on coursework (e.g., working on problem sets together). However, students are expected to obtain and demonstrate individual mastery of the course content. When collaborating on an assignment (e.g., a problem set), please list your collaborators on your submission, and please demonstrate your individual mastery of the content by using your own words and showing your work in detail.

Classroom Attendance

- If you feel sick, or if you need to isolate or quarantine based on [University protocols](#), stay home. Except for seeking medical care, avoid contact with others and do not travel.
- Notify your instructor(s) if you will be missing a course meeting or an assignment deadline.
- Non-attendance for any reason does **not** guarantee an automatic extension of due date or rescheduling of examinations/assessments.
- Please communicate and coordinate any request directly with your instructor.
- If you must miss the equivalent of more than one week of class, please contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.

Lecture Recordings

For lecture recordings, which are used at the discretion of the instructor, students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with [UArizona values](#) and educational policies ([Code of Academic Integrity](#) and the [Student Code of Conduct](#)) are also subject to civil action.