

# SYLLABUS

## Earth - Evolution of a Habitable World (PTYS/ASTR 170A1)

### Tier 1 General Education Course

Kuiper 308 Tu/Th 11:00 to 12:15

#### Course Description

This course develops a planetary science perspective on the processes that resulted in Earth, as the habitable planet we know today. We will examine how stars and solar systems are formed, what makes Earth habitable, and how physical, chemical and biological systems influence each other. We will explore the concept of habitability, and how it can be applied to worlds in our Solar System and around other stars. We will discuss how Earth's climate has changed in the past and how humans are changing the climate today. Habitability and the search for life in the universe are exciting research fields, and this course will expose students to this interdisciplinary field, including discussion of current and future spacecraft missions and exoplanet studies.

#### Instructor and Contact Information

Mark Marley, Kuiper 323A, marley@lpl.arizona.edu

Office Hours M&Th 1 - 2PM, often available at other times, drop by

TA Galen Bergsten, gbergsten@email.arizona.edu, M/W 12:30pm-1:30pm, location TBA

<https://d2l.arizona.edu/d2l/home/1110467>

#### Course Format and Teaching Methods

Lectures, in-class participation, homework assignments, exams, and an out-of-class project.

#### Course Objectives

During the course, students will learn about:

- fundamental physical forces and their impact on the formation of planets.
- how stars, the Solar System, and the Earth evolved, including the origin of the Moon, changes in Earth's atmosphere through time, and plate tectonics.
- the physical and chemical factors that influence habitability, and how they differ within our solar system and around other stars.

#### Expected Learning Outcomes

Upon the completion of this course, students will be able to:

- Apply scientific techniques for studying the Earth and other planets, the Sun and other Stars, and the Universe at large.
- Clearly communicate planetary science concepts, especially through writing.
- Describe how the Earth's climate has changed in the past and how it is likely to change in the future.

#### Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

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 pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Absences may affect a student's final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to

participate in class online activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or [drc-info@email.arizona.edu](mailto:drc-info@email.arizona.edu). If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

### Makeup Policy for Students Who Register Late

Students who register by the end of the second week of class may be given an opportunity to makeup missed assignments within a reasonable amount of time, to be mutually agreed upon by the student and instructor.

### Course Communications

This course will use a D2L website for assignments, lecture notes, and communications. Homework and projects will be submitted through the website. Email communications with instructors should include PTYS 170A1 and the student's name in the subject line and be from your UA email address; we will endeavor to respond to emails within one business day.

### Required Texts or Readings

The optional text "*How to Build a Habitable Planet*;" by Langmuir and Broecker contains useful reading material to complement the information presented in this course. An e-book version of Langmuir & Broecker can be found [here](#). Additional suggested reading will be provided throughout the semester.

### Required or Special Materials

The Turning Technology Student Response "clickers" will be used in this class and their use will constitute a portion of the in-class component. New clickers are available at the Student Union Bookstore, but many older models of Turning Technology clickers may also work.

### Assignments and Examinations: Schedule/Due Dates

The schedule of exams and assignment due dates will be announced in class and posted on the class D2L page.

### Writing Requirement

This is a [Tier-One General Education course](#) which has a requirement of at least ten pages of writing over the course of the semester. This writing will be distributed between homework, in-class writing, and the final project. There will be due dates throughout the semester for selecting and proposing a topic for the final project, turning in a draft for feedback and the opportunity to revise and resubmit, and final submission of the paper.

### Final Examination or Project

There will not be a final exam. This course will have a final writing project that will involve researching material related to the course and applying this information to produce a four-page research paper.

### Grading Scale and Policies

The Course Components will have the following weights:

3 Exams: 42% total	Homework: 25%	In-class: 8%	Final Project : 25%	
A: $\geq 90\%$	B: $\geq 80\%$	C: $\geq 70\%$	D: $\geq 60\%$	E: $< 60\%$

Final Letter Grades will be assigned as above, and will be calculated to the nearest 0.1%.

Extra-credit opportunities will be offered throughout the semester and will be posted on D2L.

University policy regarding grades and grading systems is available [here](#). Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available [here](#) and [here](#) respectively.

### Dispute of Grade Policy:

All your work will be graded by a teaching assistant or by Dr. Marley. Although we will make every effort to evaluate your work thoroughly and fairly, we are only human. If you think there is an error in grading your homework, please contact the TA first. If you have a question about an exam or final project grade, or cannot resolve a homework grade with the TA, please contact Dr. Marley. We will look at your work again and return it to you with a response, usually within a week. You must report any grading errors within a week of the return of your assignment/exam to receive a regrade.

### Honors Credit

Students wishing to contract this course for [Honors Credit](#) should email Dr. Marley to set up an appointment to discuss the terms of the contact.

### Classroom Behavior Policy

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 will 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.

Some learning styles are best served by using personal electronics, such as laptops and iPads. These devices can be distracting to other learners. Therefore, students who prefer to use electronic devices for note-taking during lecture should use the right side of the classroom.

### Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

### Accessibility and Accommodations

Recommended language is provided on the Disability Resource Center website: <http://drc.arizona.edu/instructors/syllabus-statement>.

### Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://new.library.arizona.edu/research/citing/plagiarism>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

### 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>

## Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

### **Campus Health**

<http://www.health.arizona.edu/>

Campus Health provides quality medical and mental health care services through virtual and in-person care.

Phone: 520-621-9202

### **Counseling and Psych Services (CAPS)**

<https://health.arizona.edu/counseling-psych-services>

CAPS provides mental health care, including short-term counseling services.

Phone: 520-621-3334

### **The Dean of Students Office's Student Assistance Program**

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Student Assistance helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of interventions, referrals, and follow up services.

Email: [DOS-deanofstudents@email.arizona.edu](mailto:DOS-deanofstudents@email.arizona.edu)

Phone: 520-621-7057

### **Survivor Advocacy Program**

<https://survivoradvocacy.arizona.edu/>

The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support.

Email: [survivoradvocacy@email.arizona.edu](mailto:survivoradvocacy@email.arizona.edu)

Phone: 520-621-5767

## Preferred Gender Pronoun

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is on the class roster, please let me know. Feel free to correct instructors on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me directly in class or via email (instructor email). If you wish to change your preferred name or pronoun in the UAccess system, please use the following guidelines:

**Preferred name:** University of Arizona students may choose to identify themselves within the University community using a preferred first name that differs from their official/legal name. A student's preferred name will appear instead of the person's official/legal first name in select University-related systems and documents, provided that the name is not being used for the purpose of misrepresentation. Students are able to update their preferred names in UAccess.

**Pronouns:** Students may designate pronouns they use to identify themselves. Instructors and staff are encouraged to use pronouns for people that they use for themselves as a sign of respect and inclusion. Students are able to update and edit their pronouns in UAccess.

More information on updating your preferred name and pronouns is available on the Office of the Registrar site at <https://www.registrar.arizona.edu/>.

## Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

## COVID-19 Statement

Please consult the University's [COVID-19 website](#) for the latest information. Any changes to this course's schedule, modality, or meeting location will be communicated through D2L.

Voluntary, free, and convenient COVID-19 testing is available for students on Main Campus and the COVID-19 vaccine is available for all students at Campus Health.

## Subject to Change Statement

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

## Scheduled Topics, Exams, and Deadlines

Planned lecture topics, subject to revision as semester progresses.

Lec	Date	Topic	Due	Returned
1	1/13	A Rapid Tour of Our Solar System		
Part One: Physical Forces and Scientific Tools				
2	1/18	Distances, Units, and Motion		
3	1/20	Motion and Forces		
4	1/25	Gravity: The Waltz of Planets	HW#1	
5	1/27	Light: Messenger Between Worlds		
6	2/1	Telescopes and Missions of Exploration	HW#2	HW#1
7	2/3	Energy: Getting with the flow		
8	2/8	Fission and Fusion and the battle with gravity		HW#2
	2/10	Exam #1		
Part Two: The Formation of Worlds				
9	2/15	Our Sun	Project Proposal	
10	2/17	Other Stars		
11	2/22	The Birth of Stars	HW# 3	
12	2/24	The Big Bang!		Project Proposal
13	3/1	The Birth of Planets	HW#4	HW# 3
14	3/3	Exoplanets		
15	3/15	Measuring Exoplanets		HW# 4
	3/17	Exam #2		
Part Three: The Evolution of Life				
16	3/22	The Structure and Formation of the Earth	Project Draft	
17	3/24	The Cooling Earth & Plate Tectonics		

18	3/29	What is Life?	HW#5	
19	3/31	Chemistry to (Astro)Biology		
20	4/5	The Faint Young Sun & the Greenhouse Effect		HW#5
21	4/7	The Habitable Zone & The Carbon-Silicate Cycle	HW#6	Project Draft
22	4/12	The Oxygen Revolution & Cambrian Explosion		
23	4/14	Mass Extinctions		HW#6
	4/19	Exam #3		
24	4/21	Our Nearest Neighbors: Mars & Venus	Final Project	
25	4/26	Our Nearest Neighbors: Ocean Worlds		
26	4/28	The Drake Equation: A living universe?		Final Project
27	5/3	The Anthropocene Earth		