

**Course Description:**

Thousands of planets have been discovered orbiting nearby stars. How many of these worlds can we expect to be Earth-like? We explore this question from multiple perspectives – including those of astronomers, geologists, climate scientists, and historians. We look far back at Earth's history to periods when our planet itself would appear very alien to us today. We study the nearby planets Venus and Mars, which were once more Earth-like than today. We discuss not only the evolution of Earth, Venus, and Mars as habitable worlds but also how human understanding of these planets has evolved. Finally, we apply these perspectives to the search for alien Earths in our galaxy. This interdisciplinary treatment of Earth, its neighboring planets, and planets being discovered around nearby stars allows us to consider the potentially unique position of Earth as a habitable world not only in space but in time.

Instructor:

Dr. Steve Kortenkamp, Lunar and Planetary Laboratory, Dept of Planetary Sciences
See Brightspace page for our teaching team contact information and office hours

Class Logistics and Deadlines:

This is an in-person class meeting in UA's Flandrau Science Center Planetarium Mondays and Wednesdays 12:30-1:45pm. Unless otherwise noted assignment deadlines will be at 8:00AM on the designated due dates. To ensure fairness to everyone (past, present, and future classes), late work will not be accepted after the due date/time has passed. See Fairness in Deadlines below for exceptions.

Content Topics:

- Topic 1: Course Introduction and Our Early Understanding of Earth
- Topic 2: Beginner's Guide to Earth-Like Planets
- Topic 3: Making Earth-Like Planets
- Topic 4: Oceans, Atmospheres, and Gravity
- Topic 5: Tides, Time, and the Age of Earth
- Topic 6: Was Mars once an Alien Earth?
- Topic 7: Was Venus once an Alien Earth?
- Topic 8: Finding Planets around Nearby Stars
- Topic 9: Working with Light
- Topic 10: The Doppler Effect
- Topic 11: Telescopes
- Topic 12: Asteroids and Asteroid Impacts
- Topic 13: Extreme Habitability

Course Components:

Your work in this course will involve several components; 1) engagement and participation with “in-class” work based on the course content, 2) a collection of written 1-Page Papers, 3) a *Cosmic Calendar* video documentary project that is one of our Signature Assignment options, and 4) an *Alien Earths To-Scale* video documentary project that is another of our Signature Assignment options. There will be no exams in this course. Your portfolio of 1-Page Papers and your Signature Assignment will fulfill the requirement of a summative assessment in this course.

1-Page Written Papers:

There will be 6 total 1-Page Papers. To help make sure everyone is starting off on the right foot, so-to-speak, Paper #1 is required of everyone. Failure to submit Paper #1 will trigger an administrative drop from the class. The lowest grade on the remaining 5 papers can be dropped – meaning only a total 5 of these 1-Page Papers will count. However, Paper #1 cannot be dropped so please put an honest effort into the first draft of Paper #1 that you submit. At least the first 4 of these 1-Page Papers can be revised and resubmitted for full points back after receiving a grade and feedback. However, revisions for a better grade require that the original submission meets the “Honest Effort” criteria below. See the Brightspace Content area under 1-Page Papers for guidelines and a *free* sample paper. Time-permitting we may also have revisions of Paper #5.

Division of Grade:

In this course each person designs their own customized weighting for the different components of the course from the allowed ranges listed at right. Total weighting must add up to 100%. Each component

Graded Course Components	Weight
Mandatory Grading Choice/Reflection	5%
In-Class Engagement/Participation	0-20%
Collection of Written 1-Page Papers	35-50%
<i>Cosmic Calendar</i> Video Project	0-50%
<i>Alien Earths To-Scale</i> Video Project	0-50%

is described in detail on D2L/Brightspace. Selections will be made using a Google Survey posted on D2L/Brightspace. After the selection deadline passes all grading choices are final and cannot be changed. While there is a wide variety of possible combinations, three possible configurations are provided below as examples.

Please use 5% increments like shown in these examples.

Example 1		Example 2		Example 3	
Reflection	5%	Reflection	5%	Reflection	5%
In-Class	20%	In-Class	10%	In-Class	0%
1-Page Papers	35%	1-Page Papers	50%	1-Page Papers	50%
<i>Cosmic Calendar</i>	0%	<i>Cosmic Calendar</i>	35%	<i>Cosmic Calendar</i>	20%
<i>A.E. To-Scale</i>	40%	<i>A.E. To-Scale</i>	0%	<i>A.E. To-Scale</i>	25%
Total	100%	Total	100%	Total	100%

Final Letter Grade:

Course letter grades will follow the traditional 90-80-70-60 format for A-B-C-D.

Prerequisites and General Expectations:

While there are no formal prerequisites for this class it is expected that all UA students have a healthy foundation of writing and mathematics, including arithmetic and geometry. Generally, the university expectations across disciplines are for approximately 2-3 hours of effort out of class for each hour of class time.



Honest Effort Eligibility for Paper Revisions:

First submissions of the first few 1-Page Papers are given a tentative grade along with comments/feedback. Revisions are then expected to address the feedback. In order to avoid the revision process being unfairly exploited, revisions can only be submitted if the following criteria are met: 1) A first submission is made by the original deadline, 2) the first submission is a reasonably complete response to each element of the prompt, including an SOS introduction, the required figures, the supporting-page, and the AI page, and 3) your revisions are discussed with a TA or the instructor during office hours. Only after all these conditions are met will the Brightspace submission folder open for your revisions.



Course Communication: (adapted from a syllabus by Dr. Katy Prudic)

If email communication with the instructor or TA is needed, please use only your official UA email address (e.g., kortenka@arizona.edu) and put “Alien Earths” in the subject line. This helps us sort important messages and distinguishes which class you are in (most of us are involved as instructor, TAs, and students in several different classes – Steve is teaching and co-teaching 5!). Start your email with an appropriate salutation, such as *Hi Dr K* or *Hello Angela*. It is professional and helps us to help you. I’m sure we all try to keep up with our email. But sometimes we get so many messages (100+ per day) that things get missed. Sorry about that! You may have to send a follow-up email if you have not heard back from us after about 48 hours (or a bit more if you send on a Friday evening). Assume this happened and just resend your email with something polite, like *Hi Steve, I’m just following up on my recent message. Looking forward to hearing back from you! Lucas*. We always assume you are working as best you can - we ask you to do the same for us. Here are a couple tips to improve communication: 1) include Dr K and all the TAs on your message rather than just one person, 2) drop in to one of the many office hours we’re offering for a conversation in real-time.

Course Objectives:

This course builds connections between multiple perspectives, primarily those of astronomers and geologists – that is, their ways of thinking, knowing, and doing. Specifically, students will (1) use writing to demonstrate the methodologies and knowledge that characterize these perspectives in the context of searching for Earth-like planets in space and in time, (2) use data – such as images, measurements, time lines, and observations of natural phenomena, (3) use writing to apply these perspectives to critically analyze and interpret the images and quantitative data, (4)

communicate their work – through written papers and recorded video presentations – with an audience of educated non-expert peers.

Student Learning Outcomes:

Upon successful completion of this course students will be able to (1) communicate through writing a broad understanding of the concepts involved with the evolution of Earth-like planets in our solar system and around other stars, (2) write about the approaches and methodologies of astronomers and geologists, and consider benefits of these perspectives for larger society, (3) demonstrate 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 (e.g., written papers, recorded video presentation, use of graphs and/or tables), (4) effectively communicate an understanding of these concepts to their SOS peers by writing in a variety of contexts and through consistent use of specific conventions of organization, design, style, mechanics and citation format while reflecting on their writing development and, (5) demonstrate practical skills with a variety of software, including Word, Excel, Keynote, PowerPoint, and image/video editing apps.



Use of AI Tools:

Learning to use AI tools effectively and responsibly is itself part of modern scientific and professional communication. AI tools should assist our writing, not replace the original thinking and drafting expected of us as the author. In this class, we require the use of AI tools as part of each 1-Page Paper assignments. However, our initial ideas, organization, and first drafts should be our own work before turning to AI for assistance with revision, refinement, brainstorming, or editing. The goal is for us to engage first in the **difficult but important process** of developing our own understanding and written voice and then learn how to use AI tools to strengthen that work.

To support this approach, our assignments include several features intended to emphasize authentic writing and reflection:

- 1) Papers should rely on course-specific content and concepts discussed in class.
- 2) Informal reflections on your writing process should represent your own unaided thoughts and experiences – do not refine these reflections with AI tools. Use raw voice-to-text grammar for these reflections.
- 3) Assignments include design features and review methods intended to support academic integrity and responsible AI use.



Academic Integrity:

The course web page is maintained through Brightspace. All work for this class **MUST** be submitted electronically to designated Brightspace assignment folders. The Brightspace tool will automatically check our work against on-line resources and

for overreliance on AI writing. Because of these checks, those of us who do our own work and properly cite our sources of information will not have to compete with others who commit AI plagiarism. All written work for this class must be “in our own words” - this includes responses to in-class prompts, the 1-Page Papers, and the Signature Assignments. Any work that is flagged for being copied from an AI tool will not receive credit and will be reported to the Dean of Students. When we use an AI tool for assistance and feedback, we need to be very careful by acknowledging this, properly citing the AI tool, and maintaining the integrity of our writing being “in our own words.”

Fairness in Deadlines:

All work for this class will be submitted through our class Brightspace page, into the appropriate assignment folders. To ensure fairness to everyone (past, present, and future classes), late work will not be accepted after the due date/time and designated 60-minute grace period except under extraordinary circumstances or with prior approval. If you miss a deadline by just a few minutes, email your paper to the instructor and TAs immediately and explain the situation. If you anticipate a problem meeting a deadline (job interview, travel, lingering illness, etc) email us at least 24 hours prior to the deadline.

Class Engagement and Participation:

Regular engagement and effective participation are essential to do well in this course. Anyone who hasn't sufficiently engaged with the class during the initial drop/add period will be administratively dropped to avoid issuing a W grade.

Regardless of your level of engagement, you are responsible for remaining aware of class activities and due dates.

If you must miss significant time during the course, you should contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation and to help arrange accommodations with the instructor.

Errors in Grading:

An effort will be made to return graded material in a timely manner. Make sure to review all of your graded material as soon as possible. Occasionally errors in grading may occur. If you spot such an error, you must call it to the attention of the instructor within one week.

Honors Credit:

As this is a GenEd course it is available for Honors credit. Honors contract information is available at frankehonors.arizona.edu/academics/honors-contracts. If you have ideas for an honors contract, please see the instructor during office hours.

Makeup Policy for Students Who Enroll Late:

Students who enroll before the drop/add period ends will not need special accommodations because the first deadlines come several days after this date.

Those several days can easily be used to get up to speed on the course. After the drop/add period passes, instructor permission is needed to enroll and at that time arrangements can be discussed if needed.

Required “Out-Of-Class” Activities and Effort:

In addition to the written 1-Page Papers, the Signature Assignment projects will require several hours of work outside of the “normal” class routine over the course of the semester. Generally, university expectations across disciplines are for approximately 2-3 hours of effort/activity out of class for each hour of class time.

Safety on Campus

For a list of emergency procedures for many types of incidents, please visit the website of the Critical Incident Response Team (CIRT): cirt.arizona.edu

Additional Syllabus Policies Applying to All University of Arizona Classes:

For an up-to-date list, including policies on Academic Integrity, Accessibility and Accommodations, see: catalog.arizona.edu/syllabus-policies