

## Overview

This online science course uses interactive simulations and virtual field trips to introduce astronomy, biology, chemistry, geology and physics to students as they explore the search for life beyond Earth.

## About this course

Are we alone in the Universe? If so, why? If not, where are our cosmic cousins? Such questions, once the domain of science fiction, are on the verge of being answered with science facts. Astronomers are discovering planets around other stars. Planetary scientists are exploring the worlds in our solar system. Biologists are unlocking the secrets of metabolism and evolution. Geoscientists are determining how the Earth supports life. And as we struggle to build a sustainable future for ourselves, all of us are finding out how technologically advanced civilizations rise and how they might fall.

This course surveys these topics. In the process, students master basic concepts from across the major areas of science and learn what makes the Earth a habitable world.

## Required prior knowledge and skills

To be successful in this course, we recommend basic mastery of pre-college math and science, English language fluency and computer literacy.

## Learning Outcomes

These specific objectives support the overarching objectives of the course. Our goal is that students successfully completing the course can:

- Explain the conditions that can make a planet habitable.
- Identify and justify the steps necessary to determine if an exoplanet is habitable.
- Describe the history of Earth as an inhabited world and how this knowledge informs the search for life on other worlds.

More broadly, our hope is that students who succeed in this course improve their ability to navigate new challenges by:

- Describing and interpreting observations using...
  - data analysis (e.g., reading charts and graphs),
  - foundational mathematics (e.g., fractions, formulae, exponents),
  - accessible computational methods (e.g., calculators, spreadsheets).
- Applying scientific reasoning, particularly...
  - using hypothesis-driven processes to create scientific models.
  - testing models using basic qualitative and quantitative reasoning.
  - choosing among competing ideas that have different levels of uncertainty.

- Applying problem-solving skills including...
  - breaking complex problems into multiple steps,
  - identifying the knowledge needed to solve each step,
  - and obtaining and interpreting that knowledge quantitatively and qualitatively.

## **Additional Info**

### **Course format**

*Habitable Worlds* is an innovative course with a format different from most online courses. It is built around interactive activities with rich adaptive feedback. These are not videos or simple readings and quizzes. Usually they are problem-solving activities through which you will be introduced to key concepts, and master them, in a question-driven "learn-by-doing" approach. Often they will be designed around game-like simulations that you can manipulate, or virtual field trips that you can explore. In some ways, these activities and the Project can feel like a serious game! That's not an accident: That's in fact how the pursuit of science feels to professional scientists.

This course is offered in a self-paced format. In this course, students will complete course assignments at their own pace, as long as the course is completed within one year. Self-paced courses are great for:

- Students who want to start right away
- Students who are self-directed and can set and stick to a plan for completing the course
- Students who may want to either go faster or slower than the instructor-paced version

### **Credit Designation**

This course satisfies 4 credit hours toward the Natural Sciences (SQ) General Studies requirement at Arizona State University. It is strongly encouraged that you consult with your institution of choice to determine how these credits will be applied to their degree requirements prior to transferring the credit.