SES 106: Habitable Worlds

Arizona State University

Overview

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. Inspired by this ongoing scientific revolution, Habitable Worlds surveys key concepts from across the major areas of science that help us to understand what makes Earth - or any other planet - a habitable world.

Course Prerequisites and Requirements

To be successful in this course, we recommend English language fluency and computer literacy. We also encourage you to make sure your laptop or desktop computer meets the technical requirements. MAT 170 Precalculus is strongly suggested as a prerequisite for success in this course.

What You'll Learn

- 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
- Describe and interpret observations using data analysis, foundational mathematics, and accessible computational methods
- Apply scientific reason, particularly using hypothesis-driven processes to create scientific models, test models using basic qualitative and quantitative reasoning, choose among competing ideas that have different levels of uncertainty
- Apply problem-solving skills including breaking complex problems into multiple steps, identify the knowledge needed to solve each step, and obtain and interpret that knowledge quantitatively and qualitatively

Transcript

This course appears on your transcript identically to how it appears on the transcript of an enrolled ASU student who has taken the course on one of ASU's campuses. This course includes a lab and satisfies 4 credit hours toward the Natural Science - Quantitative (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 your credit.

Exams and Grading

75 pts Introduction	145 pts Stars	108 pts Planets	152 pts Habitability
48 pts Life	84 pts Survival	260 pts Project Habitable Hunt	

Creators

Ariel Anbar

President's Professor,
School of Earth and Space Exploration and
School of Molecular Sciences

Ariel Anbar is a scientist and educator interested in Earth's past and future as an inhabited world, and the prospects for life beyond. His group develops novel geochemical methods to study topics ranging from the chemical evolution of the atmosphere and oceans to human disease. Trained as a geologist and a chemist, Anbar is a President's Professor at and the School of Molecular Sciences, and a Distinguished Sustainability Scholar in ASU's Global Institute of Sustainability. Anbar directed ASU's Astrobiology Program from 2009 – 2015 and directs the Center for Education Through Exploration. A graduate of Harvard and Caltech, he was on the faculty of the University of Rochester before moving to ASU in 2004. An author of >180 refereed papers, Anbar is a Fellow of the American Geophysical Union, the Geological Society of America, the Geochemical Society and the European Association of Geochemistry, and is a Howard Hughes Medical Institute Professor. He is a recipient of the Donath Medal and the Arthur L. Day Medal of the Geological Society of America.

Katie Berryhill

Instructional Professional

The facilitator for ASU's Universal Learner Course offerings of SES106, Habitable Worlds. Based in Northern California, she is an adjunct astronomy professor teaching general education astronomy at Los Medanos College, Solano Community College, and Chabot-Las Positas Community College District, as well as teaching Habitable Worlds at Southwestern Community College in North Carolina. Dr. Berryhill holds a bachelor's in astronomy from the University of Pennsylvania, a master's in space studies from the University of North Dakota, and an Ed.D. in science education from the University of Wyoming. She is the 2021 recipient of Solano Community College's Distinguished Part-Time Faculty Award. She is also a published narrator of astronomy and education audiobooks. Her research and course development interests are focused on teaching and engagement methods to improve student achievement in science and mathematics courses in both face-to-face and online learning environments and strategies that can help diverse groups of students learn to love astronomy.