

## PHILOSOPHY 232: PHILOSOPHY OF ASTROBIOLOGY AND SPACE EXPLORATION

In the last twenty years, there has been an explosion in human knowledge about exoplanets (=planets around other stars), as well as our most extended, detailed robotic study of another planet (Mars). In the next twenty, we will have the ability to detect atmospheric biomarkers on exoplanets and may have landed humans on the surface of Mars. This course examines conceptual, social, and ethical issues related to the search for extraterrestrial life and the exploration of space. We will study the Fermi paradox, space treaties, the role of private industry, the definition of life, listening for extraterrestrials, and Copernican reasoning. We will also study the ethics of space travel, planetary protection, and recent attempts by private groups to message extraterrestrials. Our methods will of necessity be interdisciplinary, as our subject relates to the history of colonization, the social organization and psychological aspects of exploration, and the biological and physical sciences.

### My goals for the course

#### *Class discussion*

1. I want us to build the relationships required to explore challenging ideas together with genuine connection and good humor.
2. I want us to explore challenging ideas together with genuine connection and good humor.
3. I want everyone to talk a lot, and listen a lot. The standard deviation of class participation rates should be low.
4. I want our collective intelligence and diverse backgrounds to allow us to arrive at novel and plausible positions through interdisciplinary reflection on astrobiology and space exploration.
5. I want you to engage with perspectives beyond your own, including those beyond your own cultural and historical circumstances.

#### *Writing*

6. I want you to develop your skills at generating paper topics about interdisciplinary topics that are interesting and suitable for the paper length.
7. I want you to be able to state and evaluate rigorous arguments in support of clear positions.
8. I want you to improve your skills at writing analytical essays, especially in managing secondary sources.
9. I want you to become a better editor of your peers' and your own work.

There is one required text for this course:

*Astrobiology: A Very Short Introduction*, by David Catling. Oxford University Press.

All other materials will be available on the Moodle site for this course.

### ***Schedule of Readings and Assignments***

January 23 Introduction

*Astrobiology: What We Know and Why It Matters*

January 25 PHIL 232 Syllabus  
Astrobiology background  
The evidence for and against the existence of extraterrestrial life  
*Astrobiology AVSI*, Chapters 1-5

January 30 The definition of life  
N=1 problem  
Domagal-Goldman and Wright et al., “What is life?”; “What does life on Earth tell us about habitability?”  
McKay et al., “Antarctic ecosystems as planetary models”  
Meech, “Life and its requirements”  
Knuuttila and Loettgers, “What are definitions of life good for?”  
NASA, *Archaeology, Anthropology, and Interstellar Communication*, Chapter 7

February 1 Life on Mars  
Schwenzer, Rothery, and Zarnecki, “Mars”  
Meech, “Mars habitability, environment, missions”

February 6 Life in the solar system beyond Earth and Mars  
Meech, “Outer SS habitable environments”  
*Astrobiology AVSI*, Chapter 6  
Domagal-Goldman and Wright et al., “What is known about potentially habitable worlds beyond Earth?”

February 8 Life on exoplanets  
*Astrobiology AVSI*, Chapter 7  
[Jones and Rothery, “The nature of exoplanetary systems”]  
[Jones, “How to find life on exoplanets”]  
Domagal-Goldman and Wright et al., “What are the signs of life (biosignatures) that we could use to look for life beyond Earth?”

February 13 **First paper due**  
Drake equation  
Fermi paradox  
The Great Filter  
Rare Earth  
*Astrobiology AVSI*, Chapter 8  
Circkovic, from *The Great Silence: The Science and Philosophy of Fermi’s Paradox*

- Bostrom, "Where are they? Why I hope that the search for extraterrestrial life finds nothing"  
 Kurzgesagt, "Fermi Paradox"  
 Kurzgesagt, "The Great Filter"
- February 15 Copernican reasoning  
 Simpson, "The size distribution of inhabited planets"  
 Simpson, "The longevity of habitable planets and the development of intelligent life"  
 Simpson, "Bayesian evidence for the prevalence of waterworlds"  
 Ruhmkorff and Jiang, "Copernican reasoning about intelligent extraterrestrials"
- February 20 The significance of extraterrestrial life  
 Arendt, from *The Human Condition*  
 Domagal-Goldman and Wright et al., "What significance does astrobiology have for the future of life on this planet?"  
 Malone-France, "Hell is other planets"
- Ethics and the Search for Extraterrestrial Life*
- February 22 The value of non-living environments  
 Elliott, from *Faking Nature*  
 McShane, "Why environmental ethics shouldn't give up on intrinsic value"
- February 27 Planetary protection  
 Alfred Crosby, from *The Columbian Exchange*  
 Nesvold, *Making New Worlds*, Episode 9  
 From Sale, *Conquest of Paradise*
- March 1 Colonization and colonialism  
 Césaire, "Discourse on colonialism"  
 Fanon, "On violence"  
 NASA, *Archaeology, Anthropology, and Interstellar Communication*, Chapters 8-9
- March 6 **Second paper due**  
 SETI: History, linguistics, and ethics  
 NASA, *Archaeology, Anthropology, and Interstellar Communication*, Chapters 1-6  
 Meech, "SETI: techniques and programs"  
 Lodder, "Can you find intelligent communications in ultrahigh-dimensional big data from near-infrared optical SETI?"
- March 8 METI: History, linguistics, and ethics  
 Kitchen, "Interstellar Beacon"  
 Smith, "METI or REGRETTI"  
 Vakoch, "In defence of METI"  
 Vakoch, "Messaging extraterrestrial intelligence"



April 26	Class presentations
May 1	Class presentations
May 3	Class presentations
May 8	<b>Last Day of Class</b> Nesvold, <i>Making New Worlds</i> , Episodes 1, 12, 13 Schwartz, “Our moral obligation to support space exploration”
May 13	<b>Final paper due</b>