Are We Alone? Searching for ET Life – Spring 2024

Quest 2

I. General Information

Class Meetings

- MWF (10:40-11:30) CHE 0237

Instructor

- Naibi Marinas
- Office location: Bryant Space Science Center 223
- Office hours: Wednesdays and Fridays 11:40 am to 12:40 pm or by appointment
- Contact information: marinas@ufl.edu (use Canvas inbox)
- Course Website: https://ufl.instructure.com/

Teaching Assistant

- Name: Dariannette Valentin-Martinez
- Contact information: Use the Canvas inbox

Course Description

"Are we alone?" is a question that has always been fundamental to humans, but that only recently has become the subject of empirical science. This course will focus on major scientific developments in biology and astronomy to help us understand the nature and limits of life, the distribution and exploration of habitable environments in the Universe, and the possibility of encountering extraterrestrial life. We will examine how culture, society and religion influence regional policies and regulations regarding life, habitat conservation, space exploration and approach to the question of extraterrestrial life. Students will practice scientific inquiry and critical thinking skills to gain new understanding of the dynamic nature of scientific discoveries and their impact in society. The course will be divided into four units: "What is Life?", "What kills life?", "Where can we find ET life?", and "What will be the societal impact of finding ET life?".

Quest and General Education Credit

- Quest 2
- Physical Sciences
- International (N)

This course accomplishes the Quest and General Education objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Required Readings and Works

Required:

- Life in the Universe by Bennett and Shostak (selected readings, see specific sections on weekly schedule)

Recommended:

- Astrobiology, Discovery and Societal Impact (2018) Steven J. Dick, Publisher: Cambridge University Press

Additional material:

Unit 1

- Ethics and Cloning (https://academic.oup.com/bmb/article/128/1/15/5094025)
- Human Genome Editing: A Framework for Governance, WHO
- The global governance of human cloning: the case of UNESCO (Langlois, A. The global governance of human cloning: the case of UNESCO. Palgrave Commun 3, 17019 (2017). https://doi.org/10.1057/palcomms.2017.19))

Unit 2

- Sustainable policies 2022: Environmental Policies by country: https://www.sgi-network.org/2022/Sustainable_Policies/Environmental_Policies
- Environmental Rule of Law: First Global Report (2019), https://www.unenvironment.org/resources/assessment/environmental-rule-law-first-global-reportLinks to an external site.
- "The political ecology playbook for ecosystem restoration: Principles for effective, equitable, and transformative landscapes", 2021 (https://www.sciencedirect.com/science/article/pii/S0959378021000996)

(Part of Lab – Unit 2)

- Gaia Hypothesis: http://www.gaiatheory.org/overview/ (two pages, 45 min video)
- Medea Hypothesis: Life is out to get you https://blogs.scientificamerican.com/observations/paleontologist-peter-wards-medea-hypothesis-life-is-out-to-get-you/

Unit 3

- The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? 2021 (https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final-frontier)
- Galli, A. & Losch, A. "Beyond planetary protection: What is planetary sustainability and what are its implications for space research?" (2019) Life Sciences in Space Research
- "Mars Colonization: Beyond getting there" (2018) (https://onlinelibrary.wiley.com/doi/full/10.1002/gch2.201800062)

Unit 4

- Tarter, J. C. (2013) "Contact: Who Will Speak for Earth and Should They?"- Director Center for SETI Research

- Peters, T. (2013) “Astroethics: Engaging Extraterrestrial Intelligent Life-Forms” – Pacific Lutheran Theological Seminary
- Woolf, N. J. (2013) “Survival Ethics and Astrobiology” – Steward Observatory
- Stoeger, W. R. (2013) “Astrobiology and Beyond” – Vatican Observatory

II. Graded Work

Description of Graded Work

Assignment	Weight
In-class Attendance and Participation	10 %
Weekly Reading Quizzes – Class Preparation	10 %
In-class Experiments	20 %
Journal Reflections	15 %
Panel + Reviews + Questions	20 %
Final Group Project + Reviews	25 %
Extra Credit	5 %

In-Class Attendance and Participation (10 %): We will have in-class activities and discussions to brainstorm new perspectives on the topics covered in class and how they can alter our society and our future. All students will submit questions during the semester to use in the class discussions. Scientists working on different fields of astrobiology will be invited to give short talks to the class. Students are expected to ask thoughtful questions during the presentations and write a short summary the activity afterwards. Throughout the term, we will also have movie showings of science fiction movies and discuss how the movies relate to the content covered in class.

Weekly Reading Quizzes (10 %): A major responsibility for this class will be to complete the reading assignments before we meet for class. Online multiple-choice reading quizzes based on the reading will be assigned each week.

In Class Experiments (20 %): Three experiments will be used for further exploration of the topics we study and to experience the process of science. You will be evaluated based on your participation and your answers to a set of questions about each experiment.

Journal Reflections (15 %): You will complete eight reflection journal entries throughout the term, one before and after each of the four class units. In the first entry, you will reflect on the main question organizing the class content for that unit and provide a personal answer to the question **before** we cover the material in class. This entry can be up to a few sentences in length depending on your knowledge of the topic. At the end of each unit, you will read a science fiction short story from the lists included in the Journal Reflection assignments. You will write a second journal entry evaluating the plausibility of the story taking into consideration the boundary between real science and science fiction and what you learned in class. You will need

to place yourself in the story and reflect on the lessons about yourself and humanity that can be learned from the imaginary scenarios presented and discuss how scientific knowledge and cultural norms shape our views. This second entry should be around 400-600 words.

Panel Discussions (20 %): You will select one of the following topics to lead (International ethics of human genetic manipulation, Global Environmental Policies, Ethics of space exploration and colonization, Ethics and Astrobiology) and participate in a panel discussion. These four topics are at the center of each of the four units covered in this course.
A panel discussion is a discussion of a subject of public interest by a group of persons forming a panel before an audience. You and your partners will present the views and regulations of the topic in different regions of the world and examine the cultural, economic, geographic, historical, political, and/or social experiences that influence the different approaches as well as global policies in response to the topic. After delivering the presentation, the class will submit questions, and the panel members will answer the questions. The panel will reconvene after the discussion and formulate new global policies for the topic taking into consideration the questions and ideas of other students in the class.

Basic components of Panel Discussion:

- Group Work – establish "norms" of how your group will work together and adhere to them. At the end, you will assess yourself and your group members.
- Research the topic and include facts, statistics and pertinent information to support your position on the topic.
- Prepare a slide show presentation to present the research to the class.
- Practice and time the slideshow presentation with other panel members.

Slideshow:

- Includes only essential information (facts or important points)
- No more than 3 bullets. No more than 6 words per bullet
- Correct spelling, capitalization and punctuation are used
- Must be legible – dark font on light background or light on dark
- Images, background, themes and animation support ideas so must be on topic.
- Include Works Cited using MLA citations (www.easybib.com makes it easy).

Presentation:

- No longer than 20 minutes to present slideshow and all main points.
- Do not read the information on slides. Refer to slides but keep eye contact with the audience.
- Each panel member presents using appropriate volume and gestures.
- Groups will time the speech when practicing, so you know you can keep it to the time limit – 20 minutes.
- Use flash cards if you want, but they are not required. Avoid reading flash cards and/or slides throughout your presentation.

Panel Discussion

- Follow the Panel Discussion Rules and Guidelines provided.
- Anticipate questions and responses to counter arguments.
- Attentive audience members will be assessed for their ability to record questions for presenters (questions will be written down during the presentation and submitted at the end), listen attentively and pose relevant questions.

- Exit survey: each student will indicate his or her personal opinion of the topic before the panel discussion. After the panel students will indicate if their position has changed and if so, why.

New Global Policies

- Reconvene with panel members and discuss modifications to global policies considering the audience input during the Panel discussion.
- Formulate new global policies that address your concerns and those of your classmates.

Grading: You will be graded on your ability to work well with your partners, research your topic, create a slideshow, present in front of an audience, respond to questions from the audience while following the rules of a panel discussion and address the audience concerns when you formulate the new global policies.
Peer (group members) and self-evaluation (20 %)
Audience panel evaluation (40 %)
Instructor evaluation (40 %)

Class Project (25 %): You will work on a class group project during the semester. Groups will be created by the instructor at the beginning of the semester taking into consideration students majors to ensure all groups are multidisciplinary. For the class project you will need to examine the environments of discovered habitable extrasolar planets in terms of nutrients, energy sources, liquids, temperature, and atmosphere. Your project will be to plan a mock mission to one of these habitable extrasolar planets. Students in each group will work on creating science goals for the mission, assessing the technology required, putting together a budget, and creating a short advertising video to gather support for the mission. All mock missions will compete for funding. Each group will present the mission to the class at the end of the semester, and the class will rank all missions to prioritize "funding". During the semester, students will study and discuss current international space missions, their goals and impacts.

Grading for the Class Group Project will include 40 % self- and group members evaluation score, 60 % instructor and TA evaluation. Other groups will also review the presentations and the whole class will select the best mission.

Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Grade	% Points	GPA	Grade	% Points	GPA	Grade	% Points	GPA
A	> 90	4.0	B-	77 to < 80	2.67	D+	64 to < 67	1.33
A-	87 to < 90	3.67	C+	74 to < 77	2.33	D	60 to < 64	1.0
B+	84 to < 87	3.33	C	70 to < 74	2.0	D-	57 to < 60	0.67
B	80 to < 84	3.0	C-	67 to < 70	1.67	E	< 57	0

Grading Rubric(s)

Journal Reflection

Criteria	Exemplary	Accomplished	Developing	Unsatisfactory	Total
Content Reflection	**50 points**	**40 points**	**30 points**	**15 points**	**/**50
	Reflection demonstrates a high degree of critical thinking in applying, analyzing, and evaluating key course concepts and theories from readings, and lectures. Insightful and relevant connections made through contextual explanations, inferences, and examples.	Reflection demonstrates some degree of critical thinking in applying, analyzing, and/or evaluating key course concepts and theories from readings and lectures. Connections made through explanations, inferences, and/or examples.	Reflection demonstrates limited critical thinking in applying, analyzing, and/or evaluating key course concepts and theories from readings and lectures. Minimal connections made through explanations, inferences, and/or examples.	Reflection lacks critical thinking. Superficial connections are made with key course concepts and course materials, activities, and/or assignments	
Personal Growth	**30 points**	**20 points**	**10 points**	**5 points**	**/**30
	Conveys strong evidence of reflection on own first entry to the question with a personal response to the self-assessment questions posed. Demonstrates significant personal growth and awareness of deeper meaning through inferences made, examples, well developed insights, and substantial depth in perceptions and challenges. Synthesizes current experience into future implications.	Conveys evidence of reflection on own first entry to the question with a personal response to the self-assessment questions posed. Demonstrates satisfactory personal growth and awareness through some inferences made, examples, insights, and challenges. Some thought of the future implications of current experience.	Conveys limited evidence of reflection on own first entry to the question in response to the self-assessment questions posed. Demonstrates less than adequate personal growth and awareness through few or simplistic inferences made, examples, insights, and/or challenges that are not well developed. Minimal thought of the future implications of current experience.	Conveys inadequate evidence of reflection on own first entry to the question in response to the self-assessment questions posed. Personal growth and awareness are not evident and/or demonstrates a neutral experience with negligible personal impact. Lacks enough inferences, examples, personal insights and challenges, and/or future implications are overlooked.	
Writing Quality	**20 points**	**17 points**	**12 points**	**8 points**	**/**20
	Well written and clearly organized using standard English, characterized by	Average and/or casual writing style with some organization problems.	Average and/or casual writing style that is sometimes unclear and/or	Poor writing style lacking in standard	

	elements of a strong writing style and basically free from grammar, punctuation, and spelling errors.	Writing is free from grammar, punctuation, and spelling errors.	with some errors in grammar, punctuation, and spelling.	English, clarity, language used, and/or frequent errors in grammar, punctuation, and spelling. Needs work.	
				TOTAL POINTS (sum of 4 Criteria)	**/100**

Panel Presentation

Reviewers Name:

Panel:

Use the scale to fill in the chart to help determine the grade of your classmates.
1-Strongly Agree 2-Agree 3-Somewhat Agree 4-Disagree 5-Strongly Disagree

The preparation for the presentation was very well organised and the performance ran smoothly.	
The information was highly accurate and relevant to the theme	
All the group members participated in the presentation	
Students use words, terms, and examples which the audience clearly understand.	
Presenter speaks in an understandable voice, using clear tone, enunciation, and reasonable pace; message is clearly received.	
Panel members answer all questions	

What did you learn from the presentation?
Write your questions for presenters below:

Group Work (Panel and Final Project)

Self and Peer Evaluation of Group

Please assess the work you and your classmates did on this project by the following criteria. I will consider your feedback in assigning the individual grade for the project. Please try to be as honest and fair as possible in your assessment.

5 = Excellent work; was a crucial component to the group's success

4 = Very strong work; contributed significantly to group

3 = Sufficient effort; contributed adequately to group

2 = Insufficient effort; met minimal standards of group

1 = Little or weak effort; was detrimental to group

Student Name (including yourself)	Participation in developing ideas and planning project	Willingness to discuss the ideas of others	Cooperation with other group members	Participation in creating the materials

III. Annotated Weekly Schedule

Week/ Date	Activity	Topic/Assignment (Question/Subject)
Week 1 and 2	Topic	**Unit I – What is Life? -** Defining Life
	Summary	Introduction to class. Form student groups for project and panels. Multiple definitions of life and preconceptions. The challenges of creating a global or universal definition of life. Properties of Life. Simplest life forms today.
	Readings/Works	Bennett, Sections 5.1, 5.2, 5.3, 5.4, p. 153-183
	Assignment	Reading Quiz Students sign up as panelists **Journal Reflection 1 – First Entry – In Class**
Week 3 and 4	Topic	Earth Life
	Summary	Chemistry of Life. CHON (carbon/water) life. Liquid and life. Common characteristics of all life on Earth. DNA, genetic code. Mutation and Evolution. **Movie 1:** Ethical and moral implications of genetic manipulation. **Experiment 1**: The Search for Life in Mars and the Viking Experiment
	Readings/Works	Bennett, Sections 6.1, 6.2, 6.3, 6.6 p. 199-221, 233-238 Ethics and Cloning (https://academic.oup.com/bmb/article/128/1/15/5094025)
	Assignment	Reading Quiz
		Panel 1 students prepare to present and lead discussion Additional reading for panel members: 1. Human Genome Editing: A Framework for Governance, WHO 2. The global governance of human cloning: the case of UNESCO (Langlois, A. The global governance of human cloning: the case of UNESCO. Palgrave Commun 3, 17019 (2017). https://doi.org/10.1057/palcomms.2017.19))
Week 5	Topic	Evolution and alternatives to CHON life and Panel 1
	Summary	Origin of Life. Evolution of life on Earth. Diversity of Earth Life. Convergent evolution. Intelligence. Plausible alternatives to CHON life. **Panel 1 Discussion**: Beyond Evolution: International ethics of human genetic manipulation. Regional and global approaches.
	Readings/Works	Bennett, Chapter 4, p. 104-144
	Assignment	Reading Quiz **Journal Reflection 1 – Second Entry** **Journal Reflection 2 – First Entry**

Week/ Date	Activity	Topic/Assignment (Question/Subject)
Week 6	Topic	**Unit II – What kills life?** - Environment and Life
	Summary	Planetary evolution and life. Evolution of Earth and its atmosphere. The rise of oxygen. Magnetic field, ozone layer, greenhouse effect, the Moon, and their role in the evolution of life.
	Readings/Works	Bennett, Sections 5.5, 183-189
	Assignment	Reading Quiz
		Panel 2 students prepare to present and lead discussion. Additional reading for panel members (to be updated) • Sustainable policies 2022: Environmental Policies by country: https://www.sgi-network.org/2022/Sustainable_Policies/Environmental_Policies • Environmental Rule of Law: First Global Report (2019), https://www.unenvironment.org/resources/assessment/environmental-rule-law-first-global-reportLinks to an external site.
Week 5	Topic	Environmental limits of Life
	Summary	Extremophiles (thermophiles, Psychrophiles, Halophiles, Acidophiles, Radioresistant, Endoliths). **Movie 2:** Approach and reactions to an extinction event. Societal response.
	Readings/Works	Bennett, Chapter 10, p. 333-364
	Assignment	Reading Quiz
Week 5 and 6	Topic	Environmental and space threats to life (part 1)
	Summary	The habitable zone. Evolution of the habitable zone and stellar evolution. Properties and evolution of Venus and the future of Earth. Runaway greenhouse effect. Different beliefs that shape our relationship to Earth.
	Readings/Works	Bennett, Section 6.4, p. 221-228 "The political ecology playbook for ecosystem restoration: Principles for effective, equitable, and transformative landscapes", 2021 (https://www.sciencedirect.com/science/article/pii/S0959378021000996)
	Assignment	Reading Quiz
Week 7	Topic	Environmental and space threats to life (part 2)
	Summary	Major extinction events. NEO. Radiation. End of universe scenarios. Technological threats to life. The Gaia vs. the Medea Hypothesis. **Experiment 2**: Gaia vs Medea and Impacts **Panel 2 Discussion**: Global Environmental Policies
	Readings/Works	Bennett, Section 7.1, p. 243-249 Gaia Hypothesis: http://www.gaiatheory.org/overview/ (two pages, 45 min video)

Week/ Date	Activity	Topic/Assignment (Question/Subject)
		Medea Hypothesis: Life is out to get you https://blogs.scientificamerican.com/observations/paleontologist-peter-wards-medea-hypothesis-life-is-out-to-get-you/
	Assignment	Reading Quiz **Journal Reflection 2 – Second Entry** **Journal Reflection 3 – First Entry**
Week 8	Topic	**Unit III: Where can we find ET life?** - Habitability
	Summary	What is necessary for habitability? Elements of Life: Nucleosynthesis (Big Bang, stellar nuclear fusion, supernova events and neutron star collisions). Stable energy sources: stellar, chemical, physical (tidal). Liquids/solvents. Stable environmental conditions.
	Readings/Works	Bennett, Chapter 8, p. 267-297
	Assignment	Reading Quiz
		Panel 3 students prepare to present and lead discussion (reading material included in Course Materials) • The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? 2021 (https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final-frontier) • Galli, A. & Losch, A. "Beyond planetary protection: What is planetary sustainability and what are its implications for space research?" (2019) Life Sciences in Space Research
Week 9	Topic	ET Life on Mars
	Summary	Fantasies of Martian life. Properties of Mars. Past and future of Mars. Missions to Mars. Signature of probable Martian Life: Viking missions. AHL84001: Martian meteorite. Ammonia and methane detection as bio-markers. **Movie 3:** Extraterrestrial life and exploration of our solar system
	Readings/Works	Bennett, Sections 9.1, 9.2, 9.3, p. 302-327 "Mars Colonization: Beyond getting there" (2018) (https://onlinelibrary.wiley.com/doi/full/10.1002/gch2.201800062)
	Assignment	Reading Quiz
Week 10	Topic	ET Life on the Jovian Moons
	Summary	Europa. Properties of Europa. Radiation. Liquid water and tidal heating. Life on Europa. Missions to Europa. Titan. Properties of Titan, atmosphere, liquids on Titan, methane/ethane cycle, cryovolcanoes. Life on Titan. Missions to Titan. **Panel 3 Discussion:** Ethics of space exploration
	Readings/Works	Bennett, Chapter 11, p. 369-415 (week 10-11)
	Assignment	Reading Quiz
Week 11	Topic	ET life in extrasolar planets.

Week/ Date	Activity	Topic/Assignment (Question/Subject)
	Summary	Star and planetary system formation. Best stars to search for habitable planets. The habitable zone and stellar properties. Detecting extrasolar planets. Properties of planetary systems **Experiment 3.** The Search for Life: Spectroscopy and Bio-signatures
	Readings/Works	Bennett, Sections 11.3, 11.4, 12.1, 12.2, 12.3
	Assignment	Reading Quiz **Journal Reflection 3 – Second Entry** **Journal Reflection 4 – First Entry**
Week 12	Topic	**Unit IV: What would be the impact of finding ET life?** – Communicating with ET Intelligence
	Summary	Drake Equation. The Search for ExtraTerrestrial Intelligence program (SETI). Radio searches. WOW signal (1977). Communicating with aliens. Messages sent from Earth: Arecibo broadcast of 1974, Pioneer 10 and 11 plaques, Voyager 1 and 2 plaques and records. **Group Project Work**: Colonize Your Planet
	Readings/Works	Dick, Astrobiology, Discovery and Society Impact, Chapter 1: History, p. 13-36
	Assignment	Reading Quiz
		Panel 4 students prepare to present and lead discussion Additional reading material: • Tarter, J. C. (2013) "Contact: Who Will Speak for Earth and Should They?"- Director Center for SETI Research • Peters, T. (2013) "Astroethics: Engaging Extraterrestrial Intelligent Life-Forms" – Pacific Lutheran Theological Seminary • Woolf, N. J. (2013) "Survival Ethics and Astrobiology" – Steward Observatory • Stoeger, W. R. (2013) "Astrobiology and Beyond" – Vatican Observatory
Week 13	Topic	Societal impact of ET contact
	Summary	Historical reactions to claims of encounters with ET life. Using historical analogies: pre-Columbian civilizations. The Fermi Paradox and possible solutions. **Movie 4:** Contact. Engaging ET Intelligence. Societal Impact **Group Project Work**: Colonize Your Planet
	Assignment	**Journal Reflection 4 – Second Entry** **Panel 4** Discussion: Ethics and Astrobiology
Weeks 14-15	Topic	Final Projects
	Assignment	**Final Group Project Presentations:** Colonize your planet.

IV. General Education and Quest Objectives and Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the Quest and General Education learning outcomes as follows:

General Education Physical Sciences, International and Quest

This course will

- Address concepts, theories, and terms of the scientific method in the context of astrobiology that enable us to explore the probability of extraterrestrial life.
- Cover major scientific developments in the field of biology, astronomy and planetary science that emphasize the dynamic relation between life and its environment, and how changing planetary atmospheres and stellar evolution alter the conditions for habitability.
- Explore the habitability of planets and moons within our solar system and extrasolar planets.
- Enable students to gather, analyze, evaluate data, and formulate hypothesis about the definition of life, threats to life, properties and habitability of extrasolar planets.
- Explore how astrobiologists use telescopes and experiments to gain knowledge about the universe and the probability of life beyond Earth.
- Explore how beliefs and preconceptions shape our definition of life, its needs, and our expectations for life on Earth and beyond our planet.
- Explore how beliefs and preconceptions, including intergenerational differences, define our relationship with our planet and influence our position on climate protection and environmental restoration.
- Examine how cultural, economic, socio-political systems and beliefs result in different international approaches and regulations to genetic manipulation, environmental protection, space exploration and colonization and other topics.
- Promote the development of students' global and intercultural awareness by comparing our own cultural norms and values in relation to those of other countries.

Student Learning Objectives
By the end of this course students will be able to:
Content

- **Identify, describe, and explain** major scientific developments in the field of biology, planetary science and astronomy that allow us to address the definition and environmental needs of life in our solar system and beyond. Student competency will be assessed through quizzes, experiments, and journal reflections.
- **Identify, describe, and explain** the historical, cultural, economic, political, and/or social experiences and processes that shape our approach to science as it relates to life and its environment. Student competency will be assessed through experiments, in-class discussions, panel discussions and journal reflections.
- **Discuss** the dynamic relation between life and its environment, and how changing planetary atmospheres and stellar evolution alter the conditions for habitability. Student competency will be assessed through discussions and journal reflections.

- **Compare** the different environmental conditions of planets and moons within our solar system and between our solar system and other planetary systems. Student competency will be assessed through discussions, journal reflections, and class project.

Critical Thinking

- **Gather, analyze, evaluate quantitative data to formulate testable hypothesis** about the definition of life, threats of impacts, properties and habitability of extrasolar planets. Student competency will be assessed through experiments.
- **Analyze and evaluate** international policies on genetic manipulation, environmental protection, space exploration, and colonization to formulate new tentative global policies taking into consideration the challenges presented by regional differences. Student competency will be assessed through in-class, panel discussions, and class project.
- **Analyze and discuss** international space missions and their impact on society and the political landscape.
- **Analyze and reflect** on the ways in which cultural, economic, political, and/or social systems and beliefs mediate understandings of an increasingly connected contemporary world, and the need to create global approaches to issues affecting our world. Student competency will be assessed through in-class, panel discussions and reflection journaling.

Communication

- **Summarize and present** global policies on genetic manipulation, environmental protection, space exploration and ET contact, and create new sets of policies. **Discuss** the reception and societal impact of the policies and their relation to pressing societal challenges. **Develop and present** a convincing argument to support exploring extrasolar planets. Student competency will be assessed through panel discussions and a final group project.

Connection

- **Connect course content** with alternative scenarios presented in science fiction. Critically reflect on the lessons the stories present and their personal and societal impact. Student competency will be assessed through journal reflections, in-class discussions of journal articles and science fiction movies.

V. Quest Learning Experiences

1. Details of Experiential Learning Component

Students will have the opportunity to attend two out-of-classroom learning experiences for extra credit. Students can attend one of the public nights at the Campus Teaching Observatory (available most Fridays depending on the weather) or a scheduled visit to UF/IFAS Space Plants Laboratory. At the Campus Teaching Observatory students will use telescopes to observe visible objects in the night sky. At the UF/IFAS Space Plant Lab, students will talk to plant molecular biologists about the work they are doing to grow plants in space. If one of these activities has to be canceled, we will offer an alternative option.

2. Details of Self-Reflection Component

Students will complete eight reflection journal entries throughout the term, one before and after each part of the class. In the first entry, students will be asked to reflect on the main question organizing the class content and provide a personal answer to the question before we cover the material in class. At the end of each section, students will read or view a science fiction work (lists included in the Course Material subsection of this syllabus) that also answers the question to gain insight and critically examine an alternative scenario. Students will write a second journal entry evaluating the plausibility of the story taking into consideration the boundary between real science and science fiction and what they learned in class. They will reflect on the lessons about themselves and humanity that can be learned from the imaginary scenarios presented in the story and how scientific knowledge shapes our views by re-evaluating their first journal entry.

VI. Required Policies

Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors

that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.