

**Saint Leo University**  
**SCI 215SC**  
**Science in Science Fiction**

**Course Description:**

This course investigates the science behind popular science fiction literature and film. Students will sharpen their critical thinking skills to investigate science fiction plot devices to determine if they are compatible with fundamental principles in physics, chemistry, and biology. Is it possible to travel faster-than-light? Will suspended animation prolong our time in this universe? Science topics discussed include: motion, acceleration, time dilation, energy, characteristics of living things, cloning, evolution, Earth's cycles, and climate. Students will also discuss the ethics of these new technologies in consideration of the university's guiding core values.

**Prerequisite:**

MAT 003 or placement in MAT 128 or higher and ENG 121

**REQUIRED TEXT**

The custom book package information which appears on our Saint Leo bookstore order site is as follows:

Kaku, Michio, Physics of the Impossible (Custom Package) New York: Pearson Custom  
ISBN# 9781323114841

**This custom package above was created from the following national text and resources:**

Michio Kaku (2009). Physics of the Impossible. New York: Anchor  
ISBN: 9780307278821

Issac Asimov (1957). The Naked Sun. New York: Bantam  
ISBN: 9780553293395

**Learning Outcomes:**

Upon completion of the course, students will be able to:

1. Analyze physical, biological and/or ecological systems *such as the scientific method, the realm of science, and how science differs from science fiction with respect to the universal application of physical laws and biological principles across all systems through Film/Novel Critiques, Stranger than [Science] Fiction Report, Science Fiction Composition, Messaging Intelligent Life, and Exams. SC1*
2. Evaluate possibility of interstellar travel using knowledge of interstellar distances, accelerating to subluminal speeds, the relativistic effects of traveling near the speed of light, and why accelerating faster than the speed of light across space-time is forbidden through Science Fiction Composition, Messaging Intelligent Life and Exams.
3. Identify the conditions for carbon-based life and intelligent life to exist elsewhere in the Universe, as well as the challenges of establishing communication with intelligent life elsewhere in the universe Science Fiction Composition, Messaging Intelligent Life and Exams.
4. Describe the impact of human decisions on environmental systems *by comparing and contrasting biological evolution with technological evolution as applied to the advancement of the human species. Identify how the human species is merging technology with biological functions to affect our quality of life as well as complicating the definitions of life. Critique the ethical consequences of this merger applying the university's core values through Film/Novel Critiques, Science Fiction Composition and Exams. SC2*

5. Define energy and explain energy equivalence. Evaluate the ramifications of the 2<sup>nd</sup> Law of Thermodynamics. Explain the meaning and significance of  $E=mc^2$  through Science Fiction Composition and Exams.
6. Assess different points of view, assumptions, and/or arguments *while evaluating the social justice implications of applied science and technology including accessibility across all socio-economic groups through Stranger than [Science] Fiction Report, Science Fiction Composition, Messaging Intelligent Life and Exams. CT2 Social Justice*

**Core Value:**

*Responsible Stewardship:* Our Creator blesses us with an abundance of resources. We foster a spirit of service to employ our resources to university and community development. We must be resourceful. We must optimize and apply all of the resources of our community to fulfill Saint Leo University's mission and goals.

**Evaluation:**

Students will be evaluated on the following assignments.

<b>Assignment</b>	<b>Weight (%)</b>
Midterm Exam	10
Final Exam	20
Film/Novel Critique	10
Stranger than (Science) Fiction Report	15
Science Fiction Composition	
Draft	5
Final	10
Messaging Intelligent Life	10
Discussions (8)	20
<b>Total</b>	<b>100%</b>

**Grading Scale:**

<b>Grade</b>	<b>Score (%)</b>
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D+	67-69
D	60-66
F	0-59

**Exams**

Students will complete exams in Modules 4 and 8 consisting of short answer, essay, and mathematical questions.

**Film/Novel Critique**

Students evaluate a science fiction film or novel to determine if the science and technologies used as plot devices are compatible with the laws of the universe discussed in the course.

### **Stranger than (Science) Fiction Report**

Imaginative futurism in science fiction novels has a tendency to begin as predictions of technologies that are not yet realized. In this assessment, students research a technology or scientific plot device that originated in science fiction and is now currently being explored by the scientific community. Examples include the warp drive, ion propulsion, quantum teleportation, reanimation, electromagnetic levitation, and cloaking devices.

### **(UE Key Assignment) Science Fiction Composition**

Students will create an original science fiction work focused on how a future technology or altered environment alters the landscape of equity among social classes in a dystopian society and resolve these issues towards redistribution of equity among all. Submit the Science Fiction Composition (Final) to **Chalk and Wire no later than Sunday 11:59 EST/EDT of Module 7**. The Science Fiction Composition (Final) Chalk & Wire link is located in the Module 7 folder. Students who do not submit the assignment to Chalk & Wire will receive a zero. This is a key assignment assessment; the results are used to ensure students are meeting University Exploration program goals. Video and PDF instructions can be found on the course home page. PDF instructions are also located in the Start Here folder.

### **Messaging Intelligent Life**

Students will create an artifact representing a message to send to intelligent life expressing directed first contact. Students will solve communication issues including the medium through which the message is sent, the “language” of the message, and how to indicate awareness of a desire to communicate (i.e., get their attention).

### **Discussions**

Students will participate in discussions during each module, with initial responses to the discussion question due on Thursday and responses to classmates due by Sunday.

**Course Schedule:**

**Module 1                      The Science Behind the Movies**

**Objectives**

When you complete this module, you should be able to:

- Distinguish differences between science and science fiction.
- Describe the scientific method as a process for discovering the laws of the universe.
- Identify and organize the different large-scale structures of matter in the universe by size.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an introduction to the class	Thursday 11:59 PM EST/EDT
Post an initial response to the Rules of Science discussion activity	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates in the Rules of Science discussion	Sunday 11:59 PM EST/EDT
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT

**Module 2                      Life in the Universe**

**Objectives**

When you complete this module, you should be able to:

- Create an artifact to contact an intelligent life that could establish communication, transmit a message, and ask for a response.
- Identify the necessary conditions for life to exist elsewhere in the universe.
- Justify the efforts to contact intelligent life in the universe.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit the Messaging Intelligent Life assignment	Sunday 11:59 PM EST/EDT

**Module 3** **Traveling Through Space and Time**

**Objectives**

When you complete this module, you should be able to:

- Calculate speed and acceleration.
- Apply Einstein's Special Theory of Relativity to critique the possibility of time travel.
- Report on new developments in the scientific and engineering fields that bring future technologies out of science fiction and into reality.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit the Stranger than (Science) Fiction assignment	Sunday 11:59 PM EST/EDT

**Module 4** **Energy Weapons**

**Objectives**

When you complete this module, you should be able to:

- Calculate kinetic energies for an object.
- Calculate potential energies for an object.
- Calculate energy released in annihilation using  $E=mc^2$ .
- Apply the Conservation of Energy to describe the types of energy required to explode a planet.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Complete the Midterm Exam	Sunday 11:59 PM EST/EDT

**Module 5****Human Evolution and Creating Life****Objectives**

When you complete this module, you should be able to:

- Describe how adaptations emerge and may result in the evolution of a species.
- Apply the principles of natural selection to explain the change in the gene frequency among a biological system.
- Analyze the social justice issues as humans increase their dependence on technology.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit the Science Fiction Composition - Draft	Sunday 11:59 PM EST/EDT

**Module 6****Artificial Intelligence****Objectives**

When you complete this module, you should be able to:

- Evaluate the ability to design robots that simulate the characteristics that define intelligence.
- Define Isaac Asimov's Three Laws of Robotics and evaluate the need for these laws.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit the Film/Novel Critique	Sunday 11:59 PM EST/EDT

**Module 7****Catastrophic Events on Earth****Objectives**

When you complete this module, you should be able to:

- Predict how long-term changes of atmospheric conditions affect the Earth's weather and eventually its climate.
- Evaluate the likelihood of an asteroid collision leading to an extinction level event occurring in your lifetime.
- Evaluate the proposed solutions for detecting and altering the path of Near Earth Objects.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit the Science Fiction Composition - Final	Sunday 11:59 PM EST/EDT

**Module 8****The Nature of Reality****Objectives**

When you complete this module, you should be able to:

- Identify, define, and rank the four fundamental forces of the universe.
- Describe how uncertainty about the measurements for an electron leads to a probabilistic philosophy of the nature of reality.

**Assignments**

<b>Items to be Completed:</b>	<b>Due No Later Than:</b>
Read the assigned materials	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Complete the Final Exam	Sunday 11:59 PM EST/EDT