

UHON 351: Future of Space Exploration

Spring 2026

INFORMATION

INSTRUCTOR: **Dr. Liliana Lefticariu** (Phone: 453-7373)

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Website: <http://www.geology.siu.edu/people/lefticariu.html>

Class meeting hours: T/TH 16:30-17:50

COURSE WEBSITE: <https://online.siu.edu/d2l/lp/homepage/>

COURSE DESCRIPTION:

The “Future of Space Exploration” is envisioned as a seminar course in which students will learn about past, ongoing, and future space exploration missions led by NASA, ESA, and other space agencies, as well as by private companies and mixed state-private endeavors. The theme discussed will include the physical exploration of space by unmanned robotic space probes as well as the human spaceflight to the planets, moons, and asteroids in the Solar System. This course will also provide a general overview of the origin of the Solar System, the composition of the planets and moons of the Solar System, and the variety of extraterrestrial objects that will become a major source of natural resources. The students will discuss the latest technologies to be employed for the colonization of the Moon and Mars, such as extraterrestrial water and mineral mining, soil augmentation and food production, and technologies for solar and other energy sources necessary for a successful Moon or Mars colony. Additional discussion will include the legal aspects associated with space exploration. This course will cover a broad range of subjects and will stimulate intellectual excitement, curiosity, and independent thinking for undergraduate students. The 21st Century is the century of space exploration and colonization of new planets! Students will learn all about it! This is a rigorous academic class in which students develop both theoretical and practical skills, such as critical thinking and practical application, which will further help them in their work and personal lives.

CLASS PREREQUISITES

This class has no prerequisites.

CLASS TIMES & COURSE FORMAT

Class meetings are on Tuesday and Thursday from 3:30 pm to 4:45 pm in Parkinson 202; they consist of lectures and discussion sessions. A research project is required (details will be provided during the first day of class). Course grades are based on performance in two exams, class exercises, a final project, and contributions to in-class discussions. Note: participation involves answering and asking relevant questions, as well as participating in discussions, in lectures and discussion sessions. Simply attending the class and the discussion periods does not constitute active participation in the course.

STUDENT LEARNING OBJECTIVES

At the end of this course, the students should be able to demonstrate an understanding of the main processes that drive planet formation and evolution in the Solar System, as well as the requirements for establishing a permanent human community or robotic industries on the Moon and Mars. Additionally, the students should understand that planetary sciences are based on observations of processes and planetary bodies in our solar system, and how these observations are used to understand basic phenomena governing the biogeological processes of our planet. Students should also develop confidence in science writing, as well as in reading and understanding primary literature in planetary and astrobiology.

COURSE COMPONENTS AND ASSESSMENT

Exams: There will be **two exams total**, **one** during the semester and **one final** exam on the date/time scheduled by the University. All exams will be closed-book and closed-note exams. Additional details regarding the online examination will be provided at the beginning of the class.

Homework Assignments: Four homework assignments, counting 5% each towards your final grade. Examples of past HW assignments included:

1. A presentation of a successful mission to a planetary body in the Solar System of interest to you, using the NASA resources as well as other resources available in the class library on D2L. The goal is that you can use the information learned through this assignment to learn about the future human colonies on the Moon, Mars, or somewhere else in the Solar System.
2. An inventory of the most distinct and economically important minerals and rocks known to occur on Earth, the Moon, and Mars. In most cases, you should be able to find distinct rocks and minerals for each planetary body.
3. A presentation of a company that is actively involved in Space Exploration. The companies you should research are those that excel in each of the five main categories: launching, satellite manufacturing, satellite ground operations, orbital services, and technology related to research and space exploration/colonization. Information can be found on the Space Impulse website (<https://spaceimpulse.com/>) or other similar resources.
4. An individual project in which each student designs and presents a great idea of a new or emerging technology that could be employed in a specific aspect of space exploration. Each student will be required to develop their project using web resources offered by NASA, ESA, and JSA. This technology could be in your field of study or something else you are interested in. During your presentation, you should explain the need for such technology, what is new and innovative about your proposed technology, the overall cost of implementation, and the main advantages of using it. This project will be presented during the class sessions and will consist of a 15–20-minute oral presentation/video production and a 10–15-page paper. The information in this assignment can be incorporated further into the final group project.

Final Project: A group project in which each team will focus on a Space Exploration Project. Examples can include projects that are underway, such as “**Lunar Gateway Space Station**” or “**Human Colonization of the Moon/Mars**”, a fictitious project yet to be undertaken by the Space Exploration community, or any other project approved by the instructor. You will be working on the final project throughout the semester. The final product will consist of a video presentation (and a written report that summarizes the most important information about your project. You can add graphs, pictures, or other media to illustrate facts that are significant for the mission that you choose to write about. Each time you use an external resource, please provide the source. Papers will be graded on scientific content, organization, ability to present thoughts, grammar, spelling, and most importantly, **CREATIVITY!**

Late Work Policy: I expect all assignments to be submitted online on the day they are due. You will be penalized ten percent of your grade for every day a paper is late. I will not accept papers submitted over one week after the deadline. If you become ill or the victim of an emergency, please let me know within 48 hours.

Grading Policy:

Exams	2 @ 20% = 40%
Homework Assignments	4 @ 10% = 40%
Final Project (Paper + Présentation)	10% + 10% = 20%
Class Participation (extra points)	5%

GRADE BREAKS: A = $\geq 90\%$; B = 75-89%; C = 65-74%; D = 55-65%; F = $<55\%$

A student must earn a C or above in UHON seminars to get Honors credit for the course.

TEXT AND RESOURCES:

Recommended Textbook:

- **Exploring the Solar System, by** Peter Bond. Publisher Wiley-Blackwell; 1st edition (2012) ISBN: 978-1-4051-3499-6

<http://www.wiley.com/WileyCDA/PressRelease/pressReleaseId-102553.html>

Additional resources:

- **Encyclopedia of the Solar System (Second Edition)**, by Edited by: Lucy-Ann McFadden Paul R. Weissman and Torrence V. Johnson. Publisher: Academic Press; ISBN-13: 978-0120885893. Online: <http://www.credoreference.com/vol/557>

Additional Web Resources:

NASA main web resources where you can find information about the past, present and future space missions lead by the U.S.A:

- <https://nai.nasa.gov/>
- <https://solarsystem.nasa.gov/>
- <https://www.jpl.nasa.gov/>

Gateway, which will be an outpost orbiting the Moon that provides vital support for a sustainable, long-term human return to the lunar surface:

- <https://www.nasa.gov/gateway>
- <https://www.nasa.gov/in-lunar-orbit>

European Space Agency where you can find information about the past, present and future space missions lead by European Union:

- <http://www.esa.int/ESA>

Japanese Space Agency where you can find information about the past, present and future space missions lead by Japan:

- <http://global.jaxa.jp/>

Information about various topics regarding Geology topics can be found at:

- <https://geology.com/>

Wikipedia has detailed information can be retrieved about NASA programs:

- https://en.wikipedia.org/wiki/Apollo_program
- https://en.wikipedia.org/wiki/Colonization_of_the_Moon
- https://en.wikipedia.org/wiki/Colonization_of_Mars

Additional resources will be available during class assignments and projects containing the most up to date information about the latest NASA missions.

PRELIMINARY LECTURE OUTLINE

Date	Schedule of Topics	Reading Assignments
Week 1	Introduction	Ch. 1, your textbook
Week 1	The Origin of the Solar System	Ch. 1, your textbook
Week 2	Planetary resources	Ch. 3, your textbook
Week 2	Planetary resources	Ch. 3, your textbook
Week 3	Terrestrial Planets: Surface and Interior	Web resources
Week 3	Terrestrial Planets: Surface and Interior	Ch. 7, your textbook
Week 4	Terrestrial Planets: Atmosphere and Oceans	Ch. 5, your textbook
Week 4	Terrestrial Planets: Atmosphere and Oceans	Ch. 6, your textbook
Week 5	5:00-7:00 pm: Glassman Distinguished Speaker	
Week 5	Space exploration: Mercury	Ch. 4, your textbook
Week 6	Space exploration: Venus	Ch. 4, your textbook
Week 6	Space exploration: Venus	Ch. 4, your textbook
Week 7	Space exploration: Moon	Ch. 4, your textbook
Week 7	Colonization of the Moon: economic development (1)	Ch. 4, your textbook
Week 8	Colonization of the Moon: economic development (2)	Ch. 4, your textbook
5-Mar-26	EXAM #1	No class
	Spring Break	No class
Week 9	Habitable Planets for Man	
Week 9	Mars: overview	Ch. 7, your textbook
Week 10	Mars: overview	Ch. 7, your textbook
Week 10	Mars: Landing Site Geology, Mineralogy and Geochemistry	Ch. 7, your textbook
Week 11	Colonization of Mars: advantages and disadvantages	Ch. 7, your textbook
Week 11	Colonization of Mars: possible locations for settlements	Ch. 7, your textbook
Week 12	Colonization of Mars: planetary protection	Web resources
Week 12	Colonization of Mars: ethical, political and legal challenges	
Week 13	Atmospheres of the Giant Planets	Ch. 8-11, your textbook
Week 13	Interiors of the Giant Planets	Ch. 8-11, your textbook
Week 14	Moons of the Giant Planets	Ch. 8-11, your textbook
Week 14	Colonization of the Outer Solar System	Ch. 8-11, your textbook
Week 15	Civilization and energy	Web resources
Week 15	Class project Presentations	
TBA	EXAM #2: Final week	

Disclaimer: The Instructor reserves the right to modify this schedule as needed during the semester. It is the responsibility of the student to attend class in order to learn of any changes.

Syllabus Attachment

Spring 2026

MISSION STATEMENT FOR SOUTHERN ILLINOIS UNIVERSITY CARBONDALE

SIU embraces a unique tradition of access and opportunity, inclusive excellence, innovation in research and creativity, and outstanding teaching focused on nurturing student success. As a nationally ranked public research university and regional economic catalyst, we create and exchange knowledge to shape future leaders, improve our communities, and transform lives.

IMPORTANT DATES:

Semester Classes Begin:01/12/2026
Last day to add full-term course (without Dean's signature):01/16/2026
Last day to withdraw from the University with a full refund:01/23/2026
Last day to drop a full-term course for a credit/refund:01/23/2026
Last day to drop a full-term course (W grade, no refund):.....03/27/2026
Final examinations:05/04/2026–05/08/2026

Note: Please verify the above dates with the Registrar calendar and find more detailed information on deadlines at <http://registrar.siu.edu/calendars>. For add/drop dates that apply to shorter-than-full-term courses, please look at the Schedule of Classes search results at <http://registrar.siu.edu/schedclass/index.php>

SPRING SEMESTER HOLIDAYS:

Martin Luther King, Jr.'s Birthday 01/19/2026
Spring Break 03/07/26 - 03/15/26

DIVERSITY: Southern Illinois University Carbondale's goal is to provide a welcoming campus where all of our students, faculty and staff can study and work in a respectful, positive environment free from racism and intimidation. For more information visit: <http://diversity.siu.edu>.

OFFICE FOR ACCESS AND ACCOMMODATIONS: SIU Carbondale is committed to providing an inclusive and accessible experience for all students with disabilities. Office for Access and Accommodations coordinates the implementation of accommodations. If you think you may be eligible for accommodations but have not yet obtained approval please contact OAA immediately at (618) 453-5738 or <https://access.siu.edu>. You may request accommodations at any time, but timely requests help to ensure accommodations are in place when needed. Accommodations and services are determined through an interactive process with students and may involve consideration of specific course design and learning objectives in consultation with faculty.

MILITARY COMMUNITY: There are complexities of being a member of the military community and also a student, and military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at <http://veterans.siu.edu/>.

STUDENT MULTICULTURAL RESOURCE CENTER: The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in the Student Services Building Room 140, to see the resources available and discover ways you can get involved on the campus. Visit us at <https://smrc.siu.edu/>.

SALUKI CARES: The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIUC will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For information on Saluki Cares: Call (618) 453-2461, email siucares@siu.edu, or <http://salukicare.siu.edu/>.

SAFETY AWARENESS FACTS AND EDUCATION: Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here: <http://safe.siu.edu>.

PREGNANCY: Title IX makes it clear that students who are pregnant or have a related condition may contact the Title IX Coordinator to request accommodations or to report any allegations of discrimination. The Title IX Coordinator may be contacted at: Nick Wortman, Associate Vice Chancellor for Human Resources, Southern Illinois University Carbondale, 0135 Woody Hall, 900 S. Normal Avenue, Mail Code 6520, Carbondale, IL 62901, (618) 453-6667, equity@siu.edu.

SIU COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): Mental health counseling services are available by calling [CAPS](http://caps.siu.edu) at (618) 453-5371. CAPS offers confidential same-day services and ongoing counseling. For after hours crisis care, students are encouraged to call 988, 911, or present to their nearest emergency room.

WITHDRAWAL POLICY (Undergraduate Only): Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIUC visit: <https://registrar.siu.edu/students/withdraw.php>.

SIUC'S EARLY WARNING INTERVENTION PROGRAM (EWIP): Students enrolled in courses participating in SIUC's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the University Core Curriculum's Overview webpage: <https://corecurriculum.siu.edu/for-faculty/>.

EMERGENCY PROCEDURES: We ask that you become familiar with Emergency Preparedness at SIU. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness at SIU website, and through text and email alerts. To register for alerts visit: <http://emergency.siu.edu/>.

CATALOGS:

catalog.siu.edu
gradcatalog.siu.edu - Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog.

CENTER FOR LEARNING AND SUPPORT SERVICES:

Tutoring: <https://clss.siu.edu/>
Math Labs: <http://math.siu.edu/courses/course-help.php>

WRITING CENTER: <http://write.siu.edu/>

PLAGIARISM: See the Student Conduct Code: <http://srr.siu.edu/student-conduct-code/>

INCOMPLETE POLICY (Undergraduate Only): <http://registrar.siu.edu/grades/incomplete.php>

REPEAT POLICY: <http://registrar.siu.edu/students/repeatclasses.php>

MORRIS LIBRARY HOURS: <https://libcal.lib.siu.edu/hours/>

ADVISEMENT: <http://advisement.siu.edu/>

SIU ONLINE: <https://online.siu.edu/>