ASEN 6519: Special Topics – Extravehicular Activity

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Lecture: T/Th 10:05 – 11:20 pm
Office Hours: W 4:00 – 5:00 pm

1.

Extravehicular activity (EVA) is critical for human spaceflight to achieve tasks such as habitat construction, hardware repair, and planetary exploration. These activities are complex, requiring substantial preparation to be executed safely and successfully. EVA has enabled us to accomplish some of the greatest feats of the space program, such as the Apollo moonwalks and Hubble Space Telescope repair missions. Despite its many advantages, these activities are not without cost to the astronauts who perform EVA. Much of the technology used to perform EVA is based on heritage designs and proven technology, enabling an exceptionally high safety record despite the potential risks associated with EVA. As we transition back to EVA on the surface of celestial bodies, such as the Moon or Mars, advancements in EVA hardware and new paradigms in operations will be required.

This course is designed to expose students to all aspects of EVA (see 3. Topics Covered). Although not a traditional academic topic, this course will draw upon the academic elements of design, engineering, technology development, physiology, operations, human-machine interaction, and geology to provide an interdisciplinary look at this topic. The primary learning objectives are:

Develop a historical perspective on EVA to enable an understanding of current capabilities and technologies.

Distinguish between the requirements, needs, and challenges for performing EVA in all anticipated environment regimes.

Investigate solutions to address current needs in EVA.

This course will only be offered in virtual formats (synchronously or asynchronously) this semester. I strongly encourage you to make the scheduled class time rather than watching the filmed lectures online. This class is most fruitful with active discussions, often resulting from questions asked by students. Despite the virtual format, I will strive to maintain an interactive atmosphere as much as possible.

2.

Table 1 outlines the material by which student performance will be assessed. This course will have 2 exams and we will not use the time-slot assigned during finals week, unless needed for schedule accommodations (see below). Students will engage in a team-based design project. Distribution of the project assessment is shown in Table 2. Additional details on timeline and due dates can be found in the course schedule document.

Exams (2)	30%
Homework (4)	30%
Design Project	30%
In-Class EVA Presentation	10%
	100%

Project proposal	5%
Mid-semester project review	5%
Final project deliverables	15%
Peer review	5%
	30%

To provide flexibility and accommodate those who may become ill this semester, I am pre-emptively establishing the following guidelines:

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For additional reading that may be of interest, but not required, please see:

Peter Eckart, Spaceflight Life Support and Biospherics. Springer, 1996. (Available through the CU E-library)

Nicholas de Monchaux, Spacesuit: Fashioning Apollo. MIT Press, 2011.

Thomas J. Kelly, Moon Lander. Smithsonian Books, 2001.

Dave Mindell, Digital Apollo. MIT Press, 2008

5. Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Code of Conduct.

6.

8. Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

9. Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

10. Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by members of our community. Individuals who believe they have been