

University of Colorado Anschutz/Boulder Space Health Sciences



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Vision

At the **University of Colorado center for Space Health Sciences**, we are redefining how medicine and engineering intersect to advance human space exploration. Our mission is to integrate science and technology across disciplines and domains—from physiology and behavioral health to habitat design and systems engineering—to meet the complex challenges of human spaceflight.

Through innovative educational programs, cutting-edge research, and operational collaborations, we prepare the next generation of physician-engineers, scientists, and explorers who will drive progress in this new era of space activity. From commercial low Earth orbit operations to future lunar and Martian missions, our work is focused on translating scientific discovery into practical solutions that sustain human health and performance in the most extreme environments.



Course Work: Medicine in Space and Surface Environments Course – CU Boulder

The **Medicine in Space and Surface Environments (MISSE)** course is a multidisciplinary experiential learning course that immerses students in the medical, physiological, and operational challenges of living and working in space and other extreme environments.

The course blends classroom learning with hands-on field training. Students investigate topics such as crew health maintenance, environmental hazards, life support and habitat systems, pharmacology in altered gravity, and medical system design for lunar and Martian missions. The curriculum culminates in a week-long analog mission in the Utah desert, where teams simulate planetary surface operations—including extravehicular activities, medical emergencies, and communication constraints—to apply theoretical knowledge in a realistic field environment.



Student Organization: Space Medicine Alliance

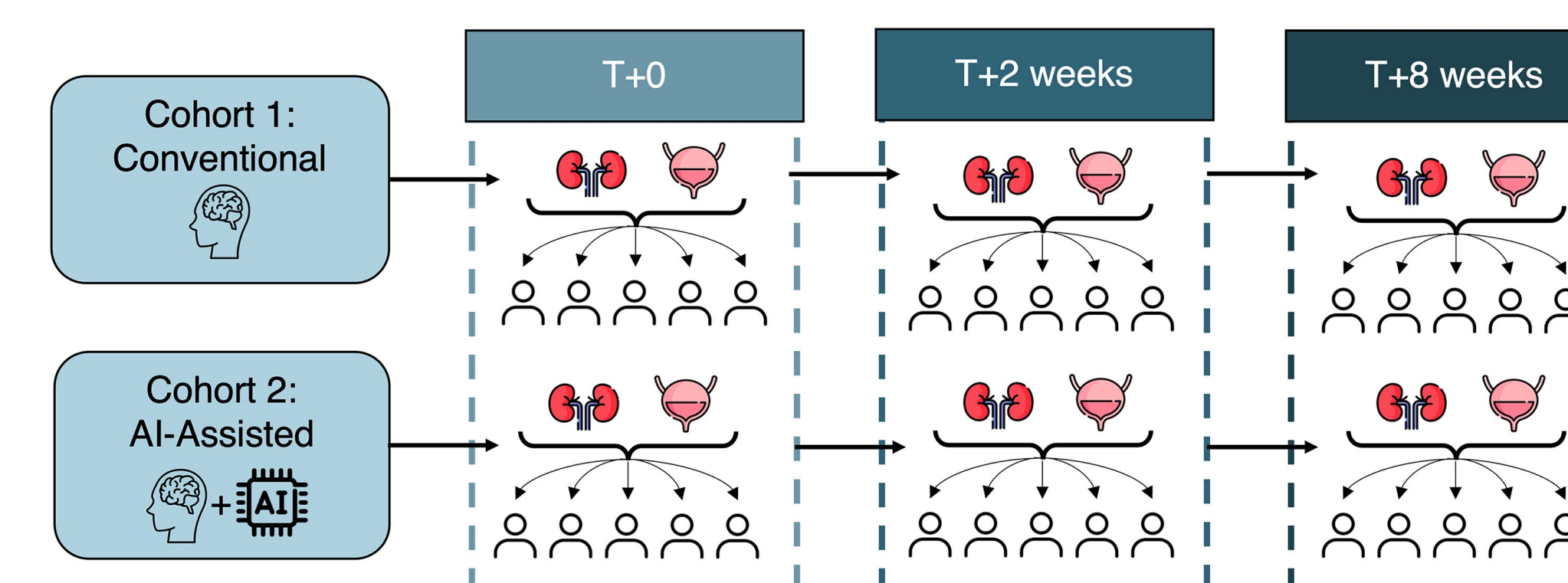
The **Space Medicine Alliance** is a student-led organization at the University of Colorado that brings together undergraduates, graduate students, and professional students from across both the **CU Boulder** and **CU Anschutz** campuses. The group unites learners from medicine, engineering, physiology, and the sciences who share an interest in human spaceflight, aerospace medicine, and health in extreme environments. Through interdisciplinary collaboration, research projects, outreach events, and guest seminars with academic and industry leaders, the Space Medicine Alliance provides a platform for students to explore and contribute to the challenges of sustaining human life beyond Earth. By bridging disciplines and campuses, the organization fosters a diverse community of future innovators committed to advancing space health and exploration.



Dual Degree: MD/MS in Medicine and Aerospace Engineering

The **University of Colorado's MD/MS in Medicine and Aerospace Engineering** is a 5-year program and the first of its kind, designed to bridge the disciplines of medicine and engineering to advance human health in spaceflight and other extreme environments. Students complete the MD curriculum at the CU School of Medicine while earning a Master of Science in Aerospace Engineering with a concentration in Bioastronautics at CU Boulder. The program prepares future physician-engineers to translate between clinical, operational, and technical domains—developing solutions to the complex challenges of sustaining human life beyond Earth.

Through immersive coursework, students explore human physiology in microgravity, life support systems, radiation protection, biomedical device design, and mission architecture. The curriculum integrates engineering principles with medical problem-solving, emphasizing quantitative modeling, human factors, and systems thinking. Students work alongside faculty from both campuses, participating in research and design projects that address real-world problems in human spaceflight and terrestrial analogs.



Research: AI- Guided Ultrasound for Novice Users

Astronauts must increasingly diagnose and manage medical conditions without real-time guidance from mission control. To address this challenge, researchers from the University of Colorado's Schools of Medicine and Aerospace Engineering conducted a study evaluating the role of **artificial intelligence (AI) assistance in point-of-care ultrasound (POCUS)** skill retention among novice operators.

This collaboration between engineers and physicians explored how AI can guide image acquisition, improve diagnostic consistency, and sustain proficiency over time—critical capabilities for autonomous healthcare in spaceflight and other remote environments. By modeling astronaut-like educational backgrounds, the study demonstrated how AI tools can bridge gaps in training and enable non-clinicians to acquire clinically useful imaging data.

Conclusion

The University of Colorado is uniquely positioned to become a national hub for **human spaceflight education, research, and operations**. By integrating expertise from the Schools of Medicine and Aerospace Engineering, we are creating a collaborative ecosystem that trains physician-engineers, develops cross-disciplinary research, and advances technologies for health and performance in extreme environments. From AI-guided medical diagnostics and space habitat systems design to field simulations in remote analogs, our programs bridge theory and practice to prepare students and researchers to address the complex realities of living and working beyond Earth.

As the world enters a new era of exploration—marked by sustained lunar missions, commercial spaceflight, and preparation for human expeditions to Mars—CU is helping shape the future of how humans explore, adapt, and thrive in space. Through education, research, and operational partnerships, we aim to equip the next generation of innovators to safeguard human health, expand our presence beyond low Earth orbit, and lead the advancement of space medicine and bioastronautics for decades to come.

Acknowledgements

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Find out more at our website:



CU Space Health