

Going to Mars: Science, Society and Sustainability

Duke Bass Connections – DeCIPHER 4 (2020-21)



Flight Crew: Savannah Artusi (Law), Shuobo Boboila (Law & Biochemistry), Changhe Chen (Economics), Adam Doll (Engineering), Joanna Feaster (Engineering), Logan Taylor (Computer Science), Angel Heredia (Political Science), Clare Holtzman (Law), Lelia Jennings (Engineering), Christopher Kilner (Ecology), Nathan Nouri (Economics), Siobhan Oca (Engineering), Shivam Patel (Public Policy), Donald Pepka (Public Policy), Ritika Saligram (Political Science), Samuel Schrader (Law), Chunxin Tang (Environmental Science), Patrick Wilson (Engineering), Jeremy Yu (Political Science).

Mission Control: Chase Hamilton—Flight Director (Law), Daniel Buckland (Medicine & Engineering), Tyler Felgenhauer (Engineering & Center on Risk), Spencer Kaplan (Public Policy), Jory Weintraub (Science & Society), Jonathan Wiener (Law, Public Policy, Environment & Center on Risk), Somia Youssef (Political Science).

Space Camp:

Six weeks of basic training on the science, technology, biology, medicine, ethics, business, law, and governance of going to Mars.

Guest Experts:

- Mark Borsuk, Duke Engineering
- Amy Schmid, Duke Biology
- Mohamed Noor, Duke Biology
- Dawn Bowles, Duke Medicine
- Sarah Deutsch, Duke History
- Emma Lehnhardt, NASA
- Jennifer Buss, Potomac Institute
- Sarah Stewart Johnson, Georgetown
- Katherine Tighe, NASA-JPL

Motivation: Settling humans on Mars – once the stuff of science fiction – now looks increasingly within reach. Today’s Duke students could be among these settlers. Motivations for going to Mars include advancing scientific knowledge, finding valuable resources, organizing a new society, and safeguarding life against catastrophic risks to Earth.

Purpose: Getting to Mars is a major technical challenge – but success will also depend on neglected questions of social, organizational, legal and political systems of settlements. Risks may arise from space travel and living on Mars, from conflicts among settlers and missions, from unjust or flawed social and legal systems, and from harming the ecosystems of Mars or the Earth.

Method: The complex mix of missions, ambitions, benefits, risks, and tradeoffs demands an interdisciplinary analysis, drawing on science, engineering, history, economics, ethics, law, international relations, and more, and connecting diverse sets of stakeholders. Could we live together on Mars?

Products and Reports:

www.ourmartian.world

Research Papers:

1. Equity and Resource Equality
2. Inter-State Collaboration, Incentives
3. International Investment, Arbitration
4. Commercial Funding
5. Backward Contamination
6. Medical Risk, Ultrasound Systems

Module 1: Habitat, Housing, and Community

Humans establishing a habitat on Mars would require oxygen, water, food, shelter from cosmic radiation, and social cohesion. This module studied key actors in a settler society, including astronauts, labor, culture, medical care, and plans for future settlers. Time span and population size would be key variables in the impacts and interests of each group, influencing budgets, resources, physical and mental health, environmental protection, scientific research, commercial interests, and the establishment of a cooperative society on Mars.

Module 2: Society and Sustainability

Growing from initial settlements to enduring societies would involve interactions among scientists, governments, businesses, settlers, future generations, and Mars itself. In this module we studied the use of Martian resources to meet each interest while also successfully preserving the interests of future generations and the planet. Sustainable land management would need to address habitation, food supply, resource extraction, tourism and leisure, scientific research, protected areas, and the tradeoffs of terraforming.

Module 3: International Relations and Security

This module considered the interests of the United Nations, national militaries, countries with and without space access, commercial enterprises, and civic organizations. Central to this module was exploring the implications of militarizing Mars for international (non-)cooperation and for public-private partnerships. We studied ways that the UN and governments on Earth could promote cooperative relations, thereby increasing equity, access to space, and prospects for peace on Mars.

Module 4: Governance on Mars

We debated key elements of a Martian Constitution, including its structure, authorities, rights, timing, and systems of reward and punishment. Should there be a government on Mars? Who should have the power to make decisions? How (de)centralized should power be? What rights should people have and how will these rights be preserved? How will constitutional issues on Mars evolve over time, such as from initial Earth-based command hierarchy to eventual Mars-based democracy? Establishing democracy on Mars would be crucial to a sustainable society, but it faces serious questions and challenges.