

ARCH 401 Spring Semester 2023

Life On Mars

Instructor: David Ellis, dellis10@illinois.edu

Time: Class meets once per week for three hours (eight sessions total)

- F/2:30-5:30pm, (five classes, online)
- Th/ (three classes TBD, for in-person meetings)
- Final exhibition

The course is based on a thought experiment:

Can humans build and inhabit communities on the planet Mars?

The question is rife with challenges: It takes five years to travel to Mars. Gravity is 1/3 what we are accustomed to on earth. The atmosphere is unbreathable. There are fierce sandstorms and there is limited sunlight. There are few if any natural resources with which to build shelter. Oh, and the temperature can dip to a chilly minus 220 degrees Fahrenheit!

And yet, this question is not so farfetched as it sounds. In fact, in 2019, NASA awarded over \$2M for a competition to build a 3D-printed habitat for Mars. They have also worked with worked with professional firms such as Foster+Partners to design modular housing settlements on the red planet. https://www.nasa.gov/directorates/spacetech/centennial_challenges/3DPHab/index.html

What are the implications for sustainable living on Earth?

Sustainable living is not merely advisable on Mars, it is essential. Travelers there must be thinking about sources of food and water, as well as tolerable indoor temperatures and breathable air, right from the start, if they hope to survive until day two! They must also have a plan for limiting and reusing waste. But if humans can figure out strategies to survive on Mars, they can survive in the harshest environments on Earth, as well.

Format

The course is a “science seminar” consisting of a series of lectures, presentations, and discussions to investigate the Martian climate as well as structures and construction methods that would be feasible using the limited resources on Mars. We will discuss science fiction films and books.



Meetings:

In lieu of papers and exams, students will work individually or in teams to develop a narrative and propose a design scheme for constructing and living on Mars.

There will be two guest lectures.

- Dr. Jacques Tempere, Professor of Theoretical Physics at the University of Antwerp, will discuss the process of traveling to Mars, as well as the climatic conditions and natural resources of the red planet. Spoiler: there are resources already there that could be used for construction.
- Corey Wang holds a Master of Architecture degree from the School of the Art Institute of Chicago. Mr. Wang is 3D fabricator in Taipei, Taiwan and an expert in digital fabrication. He will present several recent innovations in robotic construction by which habitable structures could be built on Mars before humans even arrive there.

Deliverables

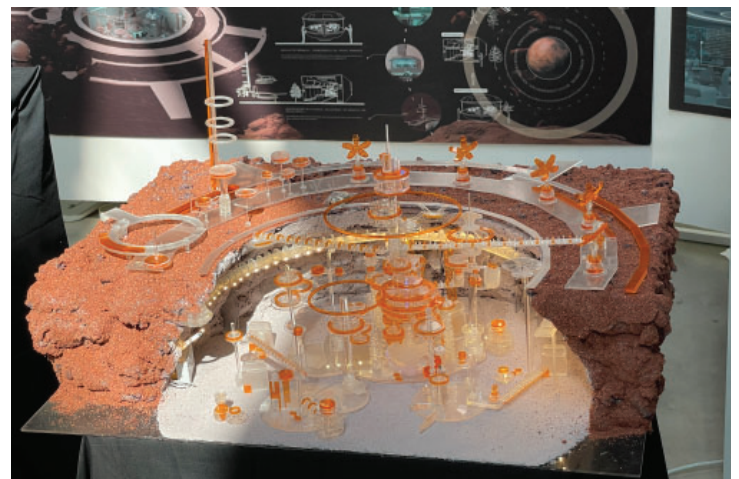
- Students will invent a story and develop a concept design that proposes a program, method of transport, and method of construction. Past student proposals have included a research institute, farm, retirement community, and prison.
- Students will produce short weekly research presentations in an area of interest, including a review of science fiction films and books.
- The final concept design will consist of drawings, models, and/or animations. The final work may be exhibited on campus.

Prerequisites

The class is open to Juniors, Seniors, and Graduate students. Students are encouraged to work in teams.



above: still images taken from an video presentation, inspired by anime



above: digital and physical models