

# ASTE 524

## Introduction to Human Spaceflight and Operations

### Fall 2020

Tuesdays, 11:00-1:40 pm

#### Course Description

This course provides an introduction to the engineering, technologies and systems required for human spaceflight including life support systems and crew accommodations. Students will expand their understanding of how to scope, plan, train and execute human spaceflight missions. The course also covers operations and flight mechanics particular to human missions including entry, descent and landing, launch escape, rendezvous, docking and extra-vehicular activity (spacewalks). Applications include human-rated launch vehicles and spacecraft, and planetary bases.

Students will be responsible for writing a final design report for a specific human spaceflight application that will demonstrate an understanding of the topics covered during the course lectures and homework assignments.

#### Topics

- Brief history of human spaceflight
- Mission Scope, Human-Rating, and Concept of Ops
- Physiological effects of spaceflight
- Life Support Systems
- Human Factors
- Launch Escape Systems and Atmospheric Entry
- Mission Operations, Training, Planning, and Procedures
- Habitability and Psychological Issues
- Rendezvous, Proximity Operations and Docking
- Human Spaceflight Destinations
- Extra-vehicular Activity Training and Operations



#### Prerequisites

- None

#### Required reading materials

- Lecture notes and publically available reading materials will be provided throughout the course.

#### Supplementary reading materials

- *Human Spaceflight, Mission Analysis and Design* (eds. Larson, McQuade and Pranke), 2014, 2nd ed. ([electronic only](#))
- *Principles of Clinical Medicine for Space Flight*, Michael R. Barratt and Sam L. Pool, Ed., Springer, 2008, ISBN: 978-0-387-98842-9
- *Human Integration Design Processes (HIDP)*, NASA/TP-2014-218556 Available [here](#)
- *NASA Human Integration Design Handbook*, Rev 1, June 5, 2014 Available [here](#)

#### Instructor

- Prof. Garrett Reisman, ASTE – [gereisma@usc.edu](mailto:gereisma@usc.edu) [USC Faculty Directory Page](#)