

Course Information

Course Information

Living and working in Space SPACE 9007

List of Prerequisites

SPACE 9001

SPACE 9002

SPACE 9003

Instructor Information

Dr. Dave Williams

Limited Duties Instructor – Western University

Course Syllabus, Schedule, Delivery Mode

This course provides an overview of the physiological adaptation of humans to short and long duration spaceflight. Students will develop an understanding of the importance of optimizing human performance in space for missions in and beyond Earth orbit. The course will introduce students to the concepts of bioastronautics, human factors and engineering design critical to success in human spaceflight.

Course Schedule

Topic: Surviving in Space

- A. Session 1 – Preparing for Human Spaceflight
 - Astronaut selection – Mercury 7 and Mercury 13
 - NASA Primate flights, Russian animal flights
 - Yuri Gagarin – Alan Shepard lessons learned
 - Parabolic flight
- B. Session 2- Mercury Program
 - Transition from suborbital to orbital flight
 - Biomedical issues
 - Physiologic adaptation to space
 - Task performance
- C. Session 3 – Gemini Program
 - Capsule design
 - Program objectives
 - Biomedical studies / issues
 - EVA

- Rendezvous
- Task Performance
- D. Session 4 – Apollo
 - Mission architecture and design
 - EVA
 - Planetary Protection – Isolation and Quarantine
 - Biomedical issues

Topic 2: LIVING AND WORKING IN SPACE

- A. Session 4 – Space Stations
 - Skylab 1 – 3
 - Medical support for long duration missions
 - Salyut
- B. Session 5 – Biomedical Results of Skylab
 - Bioastronautics
 - Physiologic adaptation
 - Medical and Behavioral issues
- C. Session 6 – Shuttle Program Reusable Launch Vehicles
 - Mission architecture
 - EVA
 - Medical support
- D. Session 7 – Research
 - Spacelab & Spacehab missions
 - DTO & DSO program
 - LSDA
- E. Session 8 – EVA
 - Biomechanics of suit design
 - EVA injury & overuse syndromes
 - Task efficiency
 - Microgravity vs. Partial Gravity EVA
- F. Session 9 – EVA & DCS
 - Prebreathe protocols
 - High pressure suit design & ops
 - Roboglove
- G. Session 10 & 11 ISS Construction - Operation
 - International collaboration
 - Medical capability
 - Research capacity
 - Biomedical issues of long duration missions
- H. Session 12 – Analogues SCIANS
 - NEEMO
 - Devon Island
 - Haughton Crater
 - Pavilion Lake
 - Antarctic
- I. Session 13 - BEO Missions

- Lunar Return mission architecture
 - Habitat Development
 - Rover operations
 - EVA
 - Medical support
- J. Session 14 – 15 Exploring Mars
- Mission architecture
 - Habitat design
 - Rover
 - EVA
 - Medical support
- K. Session 16 – Expeditionary Behavior
- Space faring culture
 - Behavior and long duration flight
 - Human hibernation
- L. Session 17 – planetary protection
- Astrobiology
 - Microbiological aspects of long duration flight
 - Search for life
- M. Session 18 – Deep Space Exploration
- Other potential locations for life in space
 - Other potential habitable destinations
 - Langrangian stations
 - The future