Stevens Institute of Technology
WebCampus (elearn.stevens.edu)
Syllabus

Course SYS635: Human Spaceflight

Overview

This course is designed to provide the conceptual framework for developing crewed space missions starting from a blank sheet of paper. It describes the crewed space mission design and analysis process. It begins with the fundamentals of the operating environment for near-Earth orbits, the Moon, and Mars. After the course, the student will be able to describe how humans will challenge the unknowns around the Moon and Mars and take on the tremendous tasks of accomplishing those missions.

Learning Goals

- The student will learn about human physiology, behavior, and design factors in those environments, and analyzes the orbits and trajectories required to perform crewed missions.
- The student will develop an understanding for practical, detailed concepts and tools to analyze and design both the space and planetary segments required to support crewed missions, including architecture and configuration, life support, vehicle subsystems, entry, landing, and ascent vehicles, habitats, surface vehicles, and in-situ resources.
- The student will also understand space propulsion systems and the process to select the launch systems required to place space assets into the proper orbit or landing destination.
- Students will learn about the mission operations segment to include operations in space, Earth-based operations, and command, control and communication.

Pedagogy

This course combines lectures, readings, real-life case studies, homework quizzes, and a design project to develop an understanding of the concepts, principles, performance metrics, and design of robotic space missions. A team project facilitates the integration and application of learned knowledge in a collaborative effort. Projects and case studies will be selected to coincide with participant interests and work related assignments.

Required Text

Required: *Human Space Mission Analysis and Design [Larson and Pranke, McGraw Hill]*

Course Outline

The course is divided into thirteen modules that are completed over the same number of weeks.
Students are required to complete approximately one quiz each week as well as 8 case studies to develop. There is no quiz the first week. To promote full team member participation, students are required to assess their own contributions and other members of their team about midway in the semester and then again towards the end of the semester, prior to the grading of the final team project.

Assignments

Specific details on the assignments are found on the course website. The graded assignments and their weights are as shown below:

1. Class Participation (discussions, assessments, profile)	8%
2. Weekly quizzes	12%
3. Mid-Term Exam	20%
3. Project	25%
4. Final Exam	35%
TOTAL	**100%**

Please note that assignments in this class may be submitted to www.turnitin.com, a web-based anti-plagiarism system, for an evaluation of their originality.

Course Schedule

Week #	Topics
1	Introduction, Design Process, Design Crew Missions
2	Space Environment, Surface Environment
3	Physiology, Human Factors, Psychology
4	Safety, Orbits
5	EDLA, Propulsion, Launch Vehicles
6	Vehicle Design, Station Design + MID-TERM EXAM
7	In-Situ Resources, Surface Bases, Surface Vehicles
8	CDH & Software, Thermal Control
9	ECLSS, Crew Accommodation
10	NGC, Power, Structures
11	EVA, Robotics
12	Operations
13	Communications, Logistics + FINAL EXAM