



Human Space Flight Mission Analysis and Design



Course Description

Human Spaceflight Mission Analysis and Design provides the conceptual framework for developing human space missions starting from basic mission objectives through architecture development and operations. The course is organized around the human space mission analysis and design process. The course aims to equip each participant with the practical tools to complete a conceptual design of a human space mission and analyse the impacts of evolving requirements.

Safety and mission assurance for human missions is examined as a critical objective. Human factors issues of physiology and performance are also explored to understand how best to ensure optimum crew performance and health. Design exercises are conducted to give first-hand experience with the techniques presented and gain experience with mission design trade-offs.

Course Topics

Module 1: Mission Design

- Designing Human Space Missions
- Safety of Human Space Missions
- Space Environments

Module 2: Crew

- Physiology of Human Spaceflight
- Human Factors and Psychology
- International Crewed Missions

Module 3: Orbits and Trajectories

- Understanding Orbits and Manoeuvres
- Describing and Using Orbits
- Orbit Manoeuvring and Rendezvous
- Entry, Descent, Landing and Ascent

Module 4: The Space Element

- Designing and Sizing Space Elements
- Designing and Sizing Transfer Vehicles
- Cost Estimating

Module 5: Support Subsystems

- Thermal Control
- Environmental Control and Life Support
- Crew Accommodation
- ADCS/GNC
- Electrical Power
- Data Handling
- Structures
- Space Propulsion
- EVA systems

Module 6: Mission Operations Element

- Mission Operations
- Command, Control and Communications (C3)
- Logistics Support
- In-Situ Resources

Case Study and Hands-on Exercises

- Project: Mars
- ISS
- Commercial Crew
- Lunar Outpost

Threaded Case Study and Hands-on Exercises

Who Should Attend

Program managers, engineers and scientists who need to understand the technical challenges involved in designing human space missions.

Course Materials

Each participant will receive:

- A copy of the course text Human Spaceflight by Larson and Pranke
- A complete electronic set of course notes with copies of the slides used in the presentation
- TSTI Alumni status allowing on-line access to course materials, including tools and videos through the Alumni Lounge

Course Objectives

At the end of this course you will be better able to tie mission elements together to describe tradeoffs between human spaceflight system design and mission operations.

You will examine human space mission design using a systems engineering approach to translating space mission objectives, requirements, and constraints into viable and cost-effective systems and operations concepts. In addition you will be able to:

- Interpret and convert space mission objectives, requirements, and constraints into visible and cost effective operations concepts
- Understand the space environment and its impact on humans and hardware
- Explain the physiology of space flight, human factors, and psychological aspects
- Describe a process-oriented approach for creating cost-effective space missions
- Describe the key functions that must be performed for mission operations
- Apply effective methodology for translating space mission objectives, requirements, and designs into viable and cost-effective operations concepts
- Explain the interrelationships and tradeoffs between system design and mission operation for military, civil, scientific and human space missions
- Develop the planning, execution and support for real-time space mission operations



KS-DOC-02237-01

Contact: info@kispe.co.uk | Courses: www.kispe.shop