



Understanding Space

An Introduction to Astronautics



Course Description

Understanding Space: An Introduction to Astronautics and Space Systems delivers the “big picture” of space missions from concept through operations.

This course begins with background on using space. Why do we go to space? What types of missions are conducted? How are space missions organized, managed and operated?

Attention then turns to basic orbital mechanics to understand opportunities and limitations imposed on missions by fundamental laws of physics.

Geostationary, Sun-synchronous and other orbits, as well as interplanetary trajectories, manoeuvring, re-entry and launch windows are also discussed.

The final section of the course examines space systems including remote sensing and other payloads, human spaceflight challenges as well as an examination of key spacecraft subsystems including rockets and launch vehicles. Course exercises are used to reinforce key topics.

Understanding Space is the ideal course for technical or non-technical professionals new to the space industry, those “cross-training” from other disciplines or anyone who needs a refresher on space fundamentals.

Course Topics

Space in Our Lives

- Space in Our Lives
- Elements of a Space Mission
- A Brief History of Space
- The Space Enterprise
- Space Systems Engineering
- Mission Management, Space Operations
- Down to Earth Issues Exploring Space

Orbits & Trajectories

- The Space Environment
- Understanding Orbits
- Describing & Using Orbits
- Orbit Design
- Orbit Manoeuvring
- Ascent and Re-entry



Space Systems

- Payload and Spacecraft Design
- Human Spaceflight
- Spacecraft Subsystems
- Rocket Science
- Launch Vehicles

Who Should Attend

Engineers, scientists, or managers either new to the space field or who want to broaden their understanding of the big picture of space systems and operations.

Course Materials

Each participant will receive:

- An e-copy of the course text Understanding Space: An Introduction to Astronautics.
- A complete set of course notes with copies of all slides used in the presentations.

Course Objectives

Gain Core Space Knowledge

- Define and describe important astronautics terms and concepts

Comprehend space mission Capabilities, Trade-offs and Limitations

- Explain how and why space is used to provide capabilities on Earth

Apply Space Concepts to real-world problems

- Calculate basic orbit and system parameters that drive mission scope and cost

Analyse Typical Space Problems

- Compare and contrast different technical approaches for space missions

Synthesize concepts to Design a Space Mission

- Design a space mission given some basic goals and objectives, and develop a top-level project plan for it

Evaluate basic technical and programmatic space issues

- Assess the technical merits of various space mission architectures

