

# Designing Space Missions and Systems

## A Practical Approach to Achieving Technical Baselines

### Course Description

Designing Space Missions and Systems examines the real-world application of the entire space systems engineering discipline.

Using a process-oriented approach, the course starts with basic mission objectives and examines the principles and practical methods for mission design and operations in depth.

Interactive discussions focus on initial requirements definition, operations concept development, architecture trade-offs, payload design, bus sizing, subsystem definition, system manufacturing, verification and operations.

This is a hands-on course with a focus on applications. Design exercises are conducted to give first-hand experience with the techniques presented and gain experience with mission design trade-offs.

### Testimonials

*"This class was beneficial for all areas of design. All Systems Engineers should take this."* - Boeing Engineer

*"The course exceeded my expectations. I did not think that the course could cover so many fundamentals of space missions!"* - ESA Engineer

*"The theory tied to practical applications well. Great presenters with thorough knowledge of the material."* - NASA Engineer

### Course Objectives

At the end of this course you will be able to apply the space mission analysis and design processes, principles, tools and techniques to develop a viable mission concept by:

- ◆ Defining high level mission goals and objectives
- ◆ Deriving system and subsystem requirements
- ◆ Identifying design solution options and drivers
- ◆ Applying design trade-off tools, techniques and methodologies to select specific solution options
- ◆ Describing the wider impact of design solutions across the rest of the mission architecture (cost, schedule, risk, integration and test, launch, and operations)

### Who Should Attend

Systems engineers, payload principle investigators, subsystem engineers or project managers who are responsible for the detailed design and operation of space systems.

### Course Materials

Each participant will receive:

- A complete set of course notes with copies of all slides used in the presentations
- An e-copy of the *Space Mission Analysis & Design-CORE* textbook

### Course Topics

- ◆ **Module 1: Space Systems Engineering and Mission Design**
  - Introduction to Applied Space Systems Engineering
  - Designing Space Missions
- ◆ **Module 2: Mission Constraints and Enablers**
  - Space Environment
  - Orbit Design and Applications,
  - Launch System Services,
  - Technical Risk Management and TRL
  - Digital Engineering Tools and Techniques
- ◆ **Module 3: Spacecraft Design**
  - Payloads
  - Spacecraft Architecture
  - Spaceflight Software
- ◆ **Module 4: Subsystem Design**
  - EPS
  - ADCS/GNC
  - Propulsion
  - Comm
  - Thermal Control
  - Structures and Configuration
- ◆ **Module 5: Mission and System Implementation**
  - Quality/Product Assurance and Standards
  - Assembly, Integration and Verification (AIV)
  - Mission Operations and Ground Systems
  - Cost and Schedule Modeling
- ◆ **Threaded case study throughout**