TEACHING SCIENCE AND TECHNOLOGY, INC.

Space Mission Design Exercise

Defining Key Mission Architectures

Course Description

The Space Mission Design Exercise is a completely hands-on workshop that provides a unique opportunity to design a real-world space mission from scratch. Course participants are given a set of mission objectives in the form of a Request for Proposal (RFP) or Announcement of Opportunity (AO) and divided into teams to conceptually design a viable mission that meets the customer expectations with an acceptable lifecycle cost and risk.

The teams are guided through a structured space system engineering approach to define a mission concept and supporting space mission architecture, and perform detailed analysis. Participants are given a comprehensive mission design and analysis tool along with a full copy of Systems Tool Kit (STK) software to analyze trade-offs and complete their design.

A minimum of in-class lecture provides "just-in-time" learning and concrete examples to keep participants on track. The product of the design exercise is a Mission Concept Review presentation where the participants are given the opportunity to outline and defend their design decisions.

The Space Mission Design Exercise provides a practical opportunity to apply space system engineering techniques in a non-threatening, real-world environment.

Course Objectives

At the end of this course you should be able to…

- Understand the overall space mission design process
- Apply systems engineering tools and techniques to a real-world space project
- Apply agile approaches to enhance teamwork and collaboration
- Apply project engineering skills
  - System engineering management
  - Technical integrity
  - Technical leadership
- Integrate all elements of a successful mission
- Establish a process to refine requirements
- Define parameters to meet mission objectives at acceptable cost and risk Course Materials

Course Materials

Each participant will receive:

- An e-copy of the course text *Understanding Space: An Introduction to Astronautics*
- A comprehensive course handout with copies of all slides used in the presentations
- Access to design and analysis tools and software

Course Topics

- **Course Introduction**
- **Foundations**
  - Project Scenario Introduction
  - Systems Engineering Overview
  - Agile Concepts and Methods
  - Project Approach
  - Introduction to Model-based Systems Engineering (MBSE)
  - Space Mission Analysis and Design
  - FireSAT Case Study and Architecture
- **Tools and Techniques**
  - SMAD Worksheet
  - System Tool Kit
  - Innoslate Quickstart
- **Application Workshop**
- **Final Presentation**

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.

Testimonials

"Very good course. [the instructor] brings such a wealth of experience and knowledge and answers questions in a thoughtful and honest way, and keeps the classroom atmosphere enjoyable and engaging."

"I really liked the hands on work. It was really helpful to look at different aspects of design."