



SYS/SDOE 632

DESIGNING SPACE MISSIONS & SYSTEMS

THIS MODULAR COURSE CAN BE TAKEN FOR GRADUATE CREDIT TOWARDS A MASTER'S IN SYSTEMS ENGINEERING OR AS PART OF A PROFESSIONAL DEVELOPMENT PROGRAM.

MODULE DESCRIPTION AND OBJECTIVES

This module examines the real-world application of the entire space systems engineering discipline. Taking 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.

MODULE ORGANIZATION

The course combines lectures and readings to develop an understanding of key space systems engineering concepts and principles. Participants are given the opportunity to apply design techniques and analysis methods to real-world problems. A team project allows students to integrate their knowledge and apply it in a team environment. The course is designed to facilitate the sharing of experiences among the professionals who participate in the program.

MODULE AUDIENCE

This module addresses the design of space missions and systems systems from the perspective of integrators, acquirers and users of these complex systems. It is intended for systems engineers, payload principle investigators, subsystem engineers or project managers who are responsible for the detailed design and operation of space systems.

COURSEWARE

Each participant will receive: a copy of the course text *Space Mission Analysis & Design* edited by Larson and Wertz, a complete set of course notes with copies of all slides used in the presentations, a demo copy of Satellite Tool Kit software by AGI.

MODULE DIRECTOR

Dr. Jerry Sellers

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MODULE REGISTRATION & INFORMATION

To inquire about registering for this modular course, please contact Stevens SDOE Program Manager, at SDOE@stevens.edu.

Enrollment forms can be completed online via

www.stevens.edu/SDOEenroll

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Babbio Center, 5th Floor
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For more information, visit the Stevens website at www.stevens.edu/SPACE



TEACHING SCIENCE AND TECHNOLOGY, INC.

DAY 1

SESSION 1

Course Overview; Introduction to Space Systems Engineering – Space Industry Trends, Introduction to Space Systems Engineering, Conceptual Space Mission Design, Operations Concept Development

SESSION 2

Operational Environments – Design and operational challenges posed by the in-orbit environments and the surface environments of the Moon and Mars

DAY 2

SESSION 3

Understanding Orbits Part 1 – Introduction to orbital mechanics, Describing and Using Orbits

SESSION 4

Understanding & Using Orbits Part 2 – Orbit Perturbations, Space Mission Geometry, Orbit Maneuvers, Interplanetary Transfers

DAY 3

SESSION 5

Space Payloads – Fundamentals of space payload design with emphasis on optical systems for remote sensing

SESSION 6

Spacecraft Design, Development & Verification Part 1 – Introduction to spacecraft bus design and sizing, Altitude Determination & Control Subsystems, Guidance Navigation & Control Subsystems

DAY 4

SESSION 7

Spacecraft Design, Development & Verification Part 2 – Communication Subsystems, Electrical Power Subsystem, Rocket Propulsion, Thermal Control Subsystem

SESSION 8

Spacecraft Design, Development & Verification Part 3 – Structures & Mechanisms, Command & Data Handling Subsystem, Mission Software, System Reliability, Integration, Verification & Validation, Entry, Landing and Ascent Vehicles, Robotic Surface Vehicles

DAY 5

SESSION 9

Launch Systems & Services, Mission Operations – Overview of launch vehicles and launch services, Mission Operation Functions, Launch & Early Orbit Operations, Operations Complexity

SESSION 10

Course Evaluation and Wrap-up – Estimating Space System Costs, Group project presentations