

**The University of Texas at El Paso
College of Engineering
Department of Mechanical Engineering
Syllabus**

Course Prefix and Number: AERO 4355
Course Title: Space Mission Design
Credit Hours: 3

Prerequisite Courses:

None

Recommended Knowledge:

The following courses are not required knowledge, but would be helpful in understanding concepts presented in this class

AERO4351: Astrodynamics and Attitude Dynamics

AERO4353: Spacecraft Environments

Course Description:

Space missions require multiple subsystems operating together in a wide range of environmental conditions, often through the collective cooperation of interdisciplinary teams under stringent operational constraints. This course provides an overview to the processes involved in a space-bound mission, from mission conception through to launch, operations, and end-of-life. The course begins with the development of the mission and its geometry, including mission concept development and utility, space law and planetary protection, cost estimation, scheduling, and end-of-life disposal requirements. These factors follow on to spacecraft design requirements and subsystem needs, including payload development and requirements, and thermal protection system design and analysis. Final course topics cover mission implementation including launch, operations, and disposal to complete mission lifecycle.

Learning Outcomes:

- Formulate mission and spacecraft constraints from environmental, political, and technological considerations
- Apply mission constraints to spacecraft design requirements
- Develop cost and schedule estimates for complex space missions
- Analyze operational and disposal requirements for space missions

Required Materials: James R. Wertz, David Everett, and Jeffrey J. Pirschell, (2011) Space Mission Engineering: The New SMAD, Macrocosm Press, USA

Course Schedule:

Week 1	Introduction to Space Missions	History of space exploration, Space communities, Principle space players,
Weeks 2-4	Space Mission Engineering	Concept definition, system drivers and critical constraints, mission analysis, requirements flow-down
Weeks 5-7	Mission Geometry	Trajectories, environment considerations, constellation designs,
Week 8	Mission Management	Mission teams, cost estimation and scheduling
Weeks 9-10	Space Policy	Space law, space policies, end-of-life requirements, planetary protection
Week 11	Spacecraft Design	Subsystem requirements from mission requirements,
Week 12	Payload Development	Payload development, design, and integration
Week 13	Thermal Protection Systems	Spacecraft structures and thermal control
Weeks 14-15	Operations	Launch vehicle requirements and capabilities, operations development, mission execution, spacecraft disposal