

Course Information

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Designing Space Missions and Systems SPACE 9003

Instructor Information

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Course Syllabus, Schedule, Delivery Mode

This course is intended to introduce students to concepts of space mission design that will provide a foundation to studying and developing space missions from mission objectives to operations. Students are encouraged to be develop their own mission concept.

Assignments will be structured to provide formative feedback on key concepts within the space mission design process. the culminating task will be to develop a preliminary space mission that incorporates the assignments and other course topics into a final study report.

Outcomes:

By the end of this course, students will be able to:

<i>Identify major elements of space systems that fit into an overall space mission</i>
<i>Communicate space mission objectives and requirements to stakeholders for review; communicate a preliminary space mission concept in a study report</i>
<i>Perform preliminary evaluation of space mission orbit and trajectory parameters</i>
<i>Conduct a trade-off study for evaluating space mission performance</i>
<i>Conceptualize the end-to-end lifecycle of a space mission</i>

Topic Outline:

Designing Space Missions and Systems is arranged as a series of topics over 12 weeks. The information is cumulative with content building on readings and assignments. Note that not all readings will be required, and key sections to focus on will be provided.

Week 1	Readings (SME-SMAD)
Introduction to Space Mission Engineering	Chapters 1,2,3,4,5

	Activities and Assignments
What is space mission engineering? What is mission concept definition? What is the space mission engineering process?	Checking Your Understanding questions in OWL Assignment 1 Issued
Week 2	Readings (SME-SMAD)
Requirements and Constraints	Chapters 6,7
	Activities and Assignments
What are requirements and how are they defined? What are constraints related to the space environment?	Checking Your Understanding questions in OWL Assignment 1 Due
Week 3	Readings (SME-SMAD)
Astrodynamics	Chapters 8,9,10
	Activities and Assignments
What is space mission geometry? How are orbits and trajectories calculated?	Checking Your Understanding questions in OWL Assignment 2 Issued
Week 4	Readings (SME-SMAD)
Spacecraft and Payloads I	Chapters 14, 15, 16, 17
	Activities and Assignments
What is the spacecraft design process? What are the major subsystems for spacecraft?	Checking Your Understanding questions in OWL Assignment 2 Due
Week 5	Readings (SME-SMAD)
Spacecraft and Payloads II	Chapters 18, 19, 20
	Activities and Assignments
What is the spacecraft design process? What are the major subsystems for spacecraft?	Checking Your Understanding questions in OWL Assignment 3 Issued
Week 6	Readings (SME-SMAD)
Spacecraft and Payloads III	Chapters 21 ,22
	Activities and Assignments
What is the spacecraft design process?	Checking Your Understanding questions in OWL

What are the major subsystems for spacecraft?	Assignment 3 Due
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Week 7	Readings (SME-SMAD)
Spacecraft and Payloads IV	Chapters 23
	Activities and Assignments
What is the relation between requirements and verification?	Checking Your Understanding questions in OWL Assignment 4 Issued

Week 8	Readings (SME-SMAD)
Spacecraft and Payloads V	Chapters 24, 25
	Activities and Assignments
What are the major risks with space missions?	Checking Your Understanding questions in OWL Assignment 4 Due

Week 9	Readings (SME-SMAD)
Ground Systems for Space Missions	Chapters 26, 27, 28
	Activities and Assignments
What ground infrastructure is required for space missions?	Checking Your Understanding questions in OWL
How are space missions launched?	Assignment 5 Issued

Week 10	Readings (SME-SMAD)
Space Mission Operations	Chapters 29, 30
	Activities and Assignments
How are space missions operated?	Checking Your Understanding questions in OWL
How do space missions end?	Assignment 5 Due

Week 11	Readings (SME-SMAD)
Catch Up / Additional Topics	Chapters 11, 12, 13 (optional)
	Activities and Assignments
Time allocated to additional topics or catching up and review of previous topics	Checking Your Understanding questions in OWL Continue work on Final Report

Week 12	Readings (SME-SMAD)
Catch Up	
	Activities and Assignments

Time allocated to additional topics or catching up and review of previous topics	Final Report Due
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