

San Jose State University
Department of Aerospace Engineering

Course: AE 210 – Advanced Space Systems Engineering

Semester: Fall 2014

Prerequisites: BSAE or Instructor consent

Instructor: Dr. Periklis Papadopoulos,
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Class Hours: Lecture: W 18:00 - 20:45

Office Hours: M,W 8:00 -9:00 p.m., M,W 10:15-11:00 a.m.

Textbook: Space Mission Analysis and Design
By: Wiley J. Larson, James R. Wertz

References: Understanding Space: An Introduction to Astronautics
By: Jerry Joe Sellers, William J. Astore, Robert B. Giffen, Wiley J. Larson,

Fundamentals of Space Systems by Vincent Pisacane and
Robert Moore, Oxford Press.

Grading:

Homework	300 points
1 st Midterm	350 points
Final Project	350 points

Grading Scale:

A+	minimum score	950
A	minimum score	900
A-	minimum score	850
B+	minimum score	775
B	minimum score	725
B-	minimum score	700
C+	minimum score	675
C	minimum score	625
C-	minimum score	600
D	minimum score	500
F	<	500

Course Goals:

1. Expose the student to the challenge of the integration of space system elements.
2. Provide in-depth exposure to at least one of the spacecraft subsystem groups.
3. Educate students in the area of analysis and optimization of multidisciplinary space systems during the conceive and design phases.

Course Learning Objectives:

Upon completion of the course students will be able to:

1. Decompose a complex space system to its sub-systems.
2. Perform design of space exploration studies.
3. Develop an aerospace system proposal, including specifications, project planning and mission scheduling.
4. Assess the impact of the mission space environment on the system design and operations.
5. Provide descriptions of the various elements comprising a space system.
6. Develop and codify a prescriptive approach to multidisciplinary modeling and quantitative assessment of new or existing system/product architectures.

Course Topics

Week Lecture Topic(s)

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| 1 | Introduction, Course Overview, Space Mission Analysis and Design |
| 2-3 | Space environment |
| 4-7 | Systems engineering process, mission objectives, design, subsystems, system-level coupling and interactions |
| 7-8 | Proposal development for system and subsystem model development: system decomposition, interface control documentation, |
| 9 | Space system design optimization and exploration techniques |
| 10 | Design sensitivity analysis, trade-off studies and approximations and multi-objective system level optimization, spacecraft design and sizing |
| 11-15 | Launch vehicles and space-craft architectures and subsystem presentations <ul style="list-style-type: none">➤ Communications, Command and Data Handling➤ Power➤ Thermal➤ Propulsion➤ Attitude Dynamics and Control➤ Structures➤ Guidance, Navigation, and Control➤ Mission Operations, Spacecraft Integration |
| 16 | Miscellaneous Topics, Summary, Review |