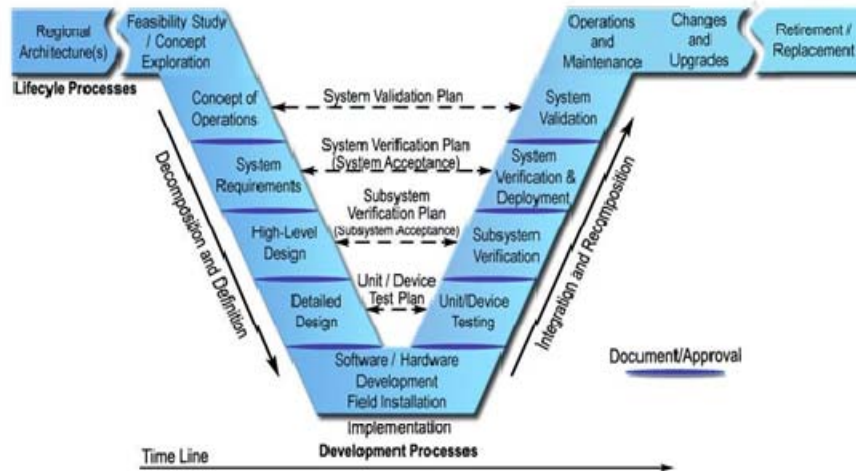


San José State University
Aerospace Engineering
AE 110 SpaceSystems Engineering, Fall 2016



Instructor: Darryl LeVasseur
Office Location: E272F
Email: darryl.levasseur@sjsu.edu
Office Hours: F 3:00 – 4:00pm or by appointment
Class Days/Time: Tuesdays & Thursdays 1:30 pm – 2:45 pm
Classroom: E164
Prerequisite: Grade of “C-“ or better in AE 165

Course Description

Introduction to design, analysis and operation of spacecraft power, communications, attitude determination/control, structures, propulsion, thermal management systems. Typical payload systems design and operation, including remote Earth sensors. System integration issues. Lab experiments and field trips.

Course Goals

1. Provide descriptions of the various elements comprising a space system.
2. Expose students to the challenge of integrating space system elements.
3. Provide an in-depth exposure to at least one spacecraft subsystem groups.
4. Educate students in the area of analysis and optimization of multidisciplinary space systems during the conceive and design phases.
5. Become familiar with the basic concepts of multi-objective optimization.

Course Learning Outcomes (CLO) (Required)

Upon successful completion of this course, students will be able to:

- + 1. Identify each element of a space system.
- + 2. Identify each subsystem of a spacecraft.
- + 3. Understand the effects of space environments on a spacecraft.
- ++ 4. Understand and implement requirement writing for systems.
- ++ 5. Understand systems contingency, margins, factors, and budgets.
- ++ 6. Apply model based system engineering techniques to design of product development
- ++ 7. Understand Manufacturers data sheets.
- ++ 8. Subdivide a complex system into smaller disciplinary models, manage their interfaces and reintegrate them into an overall system model.
- ++ 9. Perform a systems-level analysis of spacecraft subsystems including communication, power, thermal, attitude control, structures, guidance and navigation.
- ++ 10. Use traditional numerical optimization algorithms and interpret result.
- +++ 11. Conduct a risk assessment of a system and generate a risk matrix.
- +++ 12. Study a single spacecraft subsystem in detail within a team of 2-3 students and present their findings in class in a series of lectures.
- +++ 13. Rationalize and quantify a system architecture or product design problem by selecting appropriate objective functions, design parameters and constraints.
- +++ 14. Formulate a high-level spacecraft design given basic design parameters with imposed student generated requirements and constraints, involving trade-offs between competing subsystems demands.

+: Skill level 1 or 2 in Bloom's

Taxonomy ++: Skill level 3 or 4 in

Bloom's Taxonomy

+++ : Skill level 5 or 6 in Bloom's Taxonomy

Course Relationship to BSAE Program Outcomes

Learning Objectives	A	B	C	D	E	F	G	H	I
1 / 2					□□/□□				
3 / 4					□□/□□		□□/		
5 / 6	□□/								
7 / 8				/ □		□□/		□□/	
9 / 10	□□/□□			□□/	□□/				□□/
11 / 12	/ □			/ □	/ □	□□/	□□/		/ □
13 / 14	/ □		□□/□□	/ □	□□/□□	/ □	/ □	/ □	/ □

Required Texts/Readings

Textbook

Systems Engineering: Design Principles and Models

Author: Dahai Liu

ISBN13: 978-1466506831

ISBN10: 1466506830

Other Readings

NASA Systems Engineering Handbook

NSAS/SP-2007-6105 Rev1

<http://ntrs.nasa.gov/search.jsp?R=20080008301>

ISBN13: 978-0-16-079747-7

Grading Information

Homework/Quiz	250 points
1st Midterm	300 points
Final Project	350 points

A+	minimum score	850
A	minimum score	800
A-	minimum score	750
B+	minimum score	675
B	minimum score	625
B-	minimum score	600
C+	minimum score	575
C	minimum score	525
C-	minimum score	500
D	minimum score	400
F	below	400

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.

AE Department and SJSU policies are also posted at <http://ae.sjsu.edu/program-policies>.

AE 110 Space Systems Engineering Fall 2016 Course Schedule

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/30 & 9/1	Introduction, Course Overview
2	9/6 & 9/8	Model Based Systems Engineering
3	9/13 & 9/15	Project Life Cycle, Scope, & Con ops
4	9/20 & 9/22	System Hierarchy, WBS
5	9/27 & 9/29	Requirements, Writing and Understanding
6	10/4 & 10/6	Space Vehicle Subsystems
7	10/11 &	Previous week continued

Week	Date	Topics, Readings, Assignments, Deadlines
	10/13	
8	10/18 & 10/20	Space Environments
9	10/25 & 10/27	Design, Trade Studies, Iterations, Technical reviews
10	11/1 & 11/3	Previous week continued
11	11/8 & 11/10	Midterm
12	11/15 & 11/17	Risk, Optimization, Lessons Learned
13	11/22 & 11/24	Requirements Verification- Inspection, Demonstration, Test, Analysis
14	11/29 & 12/1	Management, Ethics
15	12/6 & 12/8	Miscellaneous Topics, Summary, Review