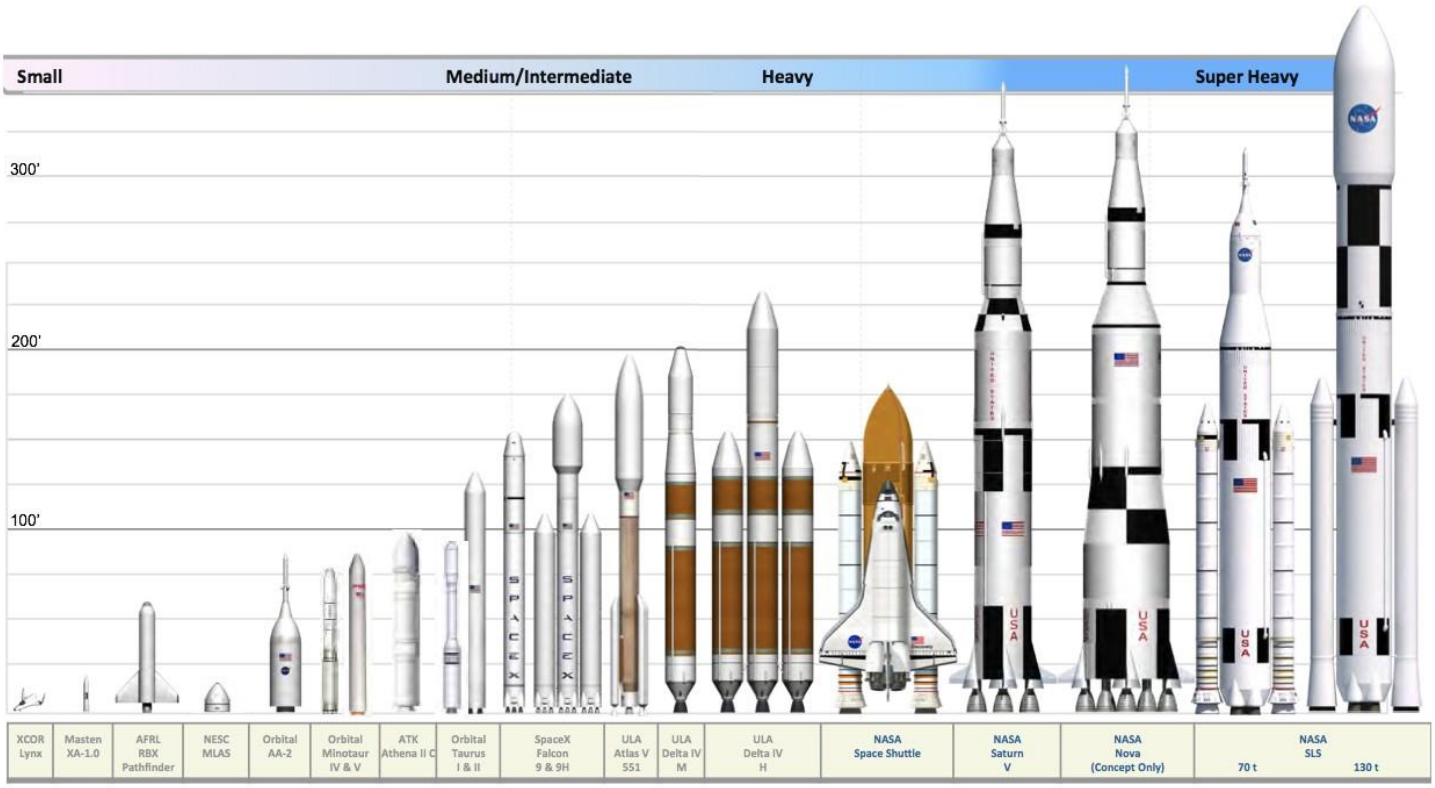
San José State University
Aerospace Engineering
AE267 Space Propulsion, Spring 2020



Instructor:	Dr. Periklis Papadopoulos
Office Location:	Engr. 272-D
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Office Hours:	T/TH 8:45 pm – 9:45 pm
Class Days/Time:	Engr.401 T/TH 7:30-8:45pm
Classroom:	BSAE or instructor consent
Prerequisites:	

Course Description

Rocket propulsion fundamentals, and propulsion requirements for multi-stage launchers. Thermochemical calculations of nozzle flow for De Laval Nozzles. Design and performance calculations for systems and components of chemical (liquid, sold, hybrid), electric, nuclear, and other advanced propulsion concepts.

Course Goals
Introduce students to:

- *Basic space propulsion principles*
- *Conservation of momentum and its applications to rocketry*
- *Combustion principles*
- *Combustor, injector, nozzle design principles*
- *Advance propulsion concepts*
- *Understand PDR, CDR, FRR propulsion system requirements and design processes*
- *The analysis and optimization of multistage space propulsion systems*

Course Learning Outcomes (CLO)

Upon completion of this course students will be able to:

1. *Derive the ideal rocket equation*
2. *Derive the thrust equation*
3. *Analyze a complete liquid propellant launch vehicle and its sub-systems*
4. *Model and analyze the combustor, injector and nozzle sub-systems*
5. *Analyze the performance of a solid rocket propulsion system*

Required Texts/Readings

Textbook:

– Elements of Propulsion, Gas Turbines and Rockets, J. Mattingly. AIAA Education Series

Other Readings: *Instructor Notes*

Midterm & Final Project

- *You must average at least 70% on your midterm and final project to receive an A or a B in the course.*

Grading Information

Workouts	100 points
Homework	200 points
Midterm Exam	300 points
Final Project	400 points

Total 1000 points
950 points < A+
900 points < A
850 points < A-
800 points < B+
750 points < B
700 points < B-
670 points < C+
650 points < C
600 points < D
Below 600 points = F

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	1-Feb	Introduction Handouts, Sutton Ch1
2	8-Feb	Theoretical Fundamentals Sutton Ch2, Anderson
3	15-Feb	Rocket Equation Sutton Ch3, Anderson
4	22-Feb	Liquid Engine Fundamentals Sutton, Ch6, 8 Team Project Kick-off
5	29-Feb	Flight Performance, Chamber design, Nozzle Thermal control Sutton, Ch4, Sellars
6	7-Mar	Solids and Hybrids Handouts Sutton
7	14-Mar	Nuclear and Ion Handouts Team Project SRR
8	21-Mar	Mid Semester Exam
9	28-Mar	NO CLASS - SPRING BREAK
10	4-Apr	Aerospike and Spacecraft Propulsion Handouts, Sutton
11	11-Apr	Ion, VASIMR, Solar Sail Handouts, Sutton Team Project CDR
12	18-Apr	Brayton, Jet, Rankine Cycle Thermodynamics Cengel, Boles ch8
13	25-Apr	Liquid Propellants, Chem Rocket Performance Sutton
14	2-May	Rocket History
15	9-May	Final Presentations Final Presentations
16	16-May	Miscellaneous Topics, Summary, Review / Final project presentations

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 at http://www.sjsu.edu/gup/syllabusinfo/

AE Department and SJSU policies are also posted at http://www.sjsu.edu/ae/programs/policies/