

San José State University
Aerospace Engineering
AE 267, Space Propulsion, (28471) Spring 2016

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| Instructor: | Nik Djordjevic (pronounced George-a-vich) |
| Telephone: | (650) 999-1287 |
| Email: | nikd0303@gmail.com |
| Office Hours: | By appointment, Mo 3:30-4:30 AE272F |
| Class Days/Time: | Mo 4:30-7:15 p.m. |
| Classroom: | Boccardo Business Center 105 |
| Prerequisites: | BSAE or Instructor Consent |

Course Description

Rocket propulsion fundamentals, propulsion requirements for multi-stage launch, Thermochemical calculations of nozzle flow for De Laval Nozzles. Design and performance calculations for systems and components of chemical (liquid, solid, hybrid), electric, nuclear, and other advanced propulsion concepts. Overview of air breathing concepts (turbojet, turbofan).

Canvas and Course Messaging

Copies of the course materials such as the syllabus, assignments, exam review material, power point presentations, etc. may be found on the Canvas site for the class Homework assignments and electronic classroom materials (such as power point slides) are posted on this site.

To log in, go to the Canvas URL <http://sjsu.instructure.com>. Log in with your 9-digit SJSU ID and password you use for your SJSUOne account. For questions on the use of Canvas, please check out http://www.sjsu.edu/at/ec/canvas/student_resources/index.html

You are responsible for regularly checking with the messaging system through Canvas. You can set up your Canvas account to forward all email sent to your Canvas account to any other email address you wish.

Required Texts/Readings

Textbook: *Rocket Propulsion Elements, Sutton & Biblarz, 7th Ed*

References:

- Elements of Propulsion, Gas Turbines and Rockets, J. Mattingly. AIAA Education Series
- Modern Compressible Flow, Anderson, 3rd Edition
- Introduction to Flight, Anderson, 7th Edition
- Space Mission Analysis and Design, Larson and Wertz, 3rd edition
- Fundamentals of Space Systems, Pisacane and Moore
- Understanding Space, Sellers
- Class handouts and presentation charts,

Classroom Protocol

Exams and in class exercises will be given at the beginning of class, so plan to be on time. Refrain from checking your email, and/or using your laptops, iPads, tablets, cell phones or any other electronic devices UNLESS AS A PART OF CLASS ACTIVITIES.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the [current academic calendar](http://www.sjsu.edu/academic_programs/calendars/academic_calendar/) web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/.

The [Late Drop Policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Grade Distribution

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|----|-----------|----|-----------|
| A | 90.0-100 | A- | 87.0-89.9 |
| B+ | 84.0-86.9 | B | 80.0-83.9 |
| B- | 77.0-79.9 | C+ | 74.0-76.9 |
| C | 70.0-73.9 | C- | 67.0-69.9 |
| D+ | 60.0-66.9 | D | 57.0-59.9 |
| D- | 50.0-56.6 | F | <50.0 |

Grading:

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|------------------------------------|-----|
| Student project and presentations* | 45% |
| Review of a technical paper ** | 15% |
| Homework and in class exercises*** | 20% |
| Mid-semester Exam + | 20% |

* Teams of 4 to 5 students will work on a design of a propulsion system.

** Each student will be assigned one technical paper to review, and in some cases do additional work based on the material in the paper. Work shall be summarized in a written report. Papers shall be relevant to the student's team project.

*** Homework on selected topics will be assigned periodically throughout the semester and will be due as noted, typically one week later. Also, students will be lecturing on topics of interest, and will be doing in-class exercise, design calculations and similar.

+ There will be no make-up of the mid-semester exam. If a student misses this exam the 25% weight of this exam will be evenly distributed among the other three grade components (project, technical paper and homework.)

Work Handed In:

For all work, including problems done by hand, include your name, date, and homework/exercise assignment number at the top of your assignment.

- Begin each problem by summarizing the problem statement. Give enough information that someone could understand the problem without looking up the problem in the book/handout. A figure is often helpful, particularly as problems become more complicated later in the semester.
- List all assumptions, where appropriate.
- Write down all equations in symbolic form first, before putting in numbers.
- Keep units with all equations. This step is very important.

No late homework is accepted without a university-authorized excuse. Homework/exercise/exam grades are not negotiable and will not be changed once assigned. Students are encouraged however, to discuss their work with the instructor.

University Policies

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sa.sjsu.edu/judicial_affairs/index.html) is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors.

A major problem in ME 113 is that many students copy homework from one another or else rely very heavily on assistance from friends in completion of homework. This may improve your homework grade, but it will result in poor or even failing exam grades. The best way to handle homework is to struggle through it in your own first. Use your book and notes to help you. Then if you're stuck, ask your instructor or friends from class for hints. You are welcome to compare homework answers or solution methods with your friends after you have completed your problems.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

Student Technology Resources

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs are available in ENG 213/215. Computers are also available in the Martin Luther King Library. The computer program EES, which may be used in this class (exact details to be announced by the instructor in class), will be made available separately if required. Your textbook may also include a copy of EES, but it is a very limited copy that does not allow you to copy or print results.

Learning Assistance Resource Center

The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The [LARC website](http://www.sjsu.edu/larc/) is located at <http://www.sjsu.edu/larc/>.

Additional tutoring may be available through the engineering honor societies. An announcement will be made in class when this becomes available.

Tentative* AE267 Schedule Spring 2016

*Exact Chapters and sections to be announced in class.

| Date | Topic | Reference | Team Project Schedule |
|--------|--|----------------------|-----------------------|
| 1-Feb | Introduction | Handouts, Sutton Ch1 | |
| 8-Feb | Theoretical Fundamentals | Sutton Ch2, Anderson | |
| 15-Feb | Rocket Equation | Sutton Ch3, Anderson | |
| 22-Feb | Liquid Engine Fundamentals | Sutton, Ch6, 8 | Team Project Kick-off |
| 29-Feb | Flight Performance, Chamber design, Nozzle Thermal control | Sutton, Ch4, Sellars | |
| 7-Mar | Solids and Hybrids | Handouts Sutton | |
| 14-Mar | Nuclear and Ion | Handouts | Team Project SRR |
| 21-Mar | Mid Semester Exam | | |
| 28-Mar | NO CLASS - SPRING BREAK | | |
| 4-Apr | Aerospike and Spacecraft Propulsion | Handouts, Sutton | |
| 11-Apr | Ion, VASIMR, Solar Sail | Handouts, Sutton | Team Project CDR |
| 18-Apr | Brayton, Jet, Rankine Cycle Thermodynamics | Cengel, Boles ch8 | |
| 25-Apr | Liquid Propellants, Chem Rocket Performance | Sutton | |
| 2-May | Rocket History | Handout | |
| 9-May | Final Presentations | | Final Presentations |
| 16-May | Final Presentations | | Final Presentations |