ASEN 5148-001,002: Spacecraft Design

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Office Hours: By appointment

Course Website Canvas

Textbook *Spacecraft Systems Engineering – 4th Edition* – Fortescue, Swinerd & Stark

Textbook online Texbook at Wily online libraryLinks to an external site.
Textbook at WileyLinks to an external site.
Textbook at openlibrary (free download)Links to an external site.

Software CU software catalog (CAD, MS, MatLab, etc.)

Lectures 2:30 pm - 3:45 pm MT Tu/Th

Classroom: AERO N240

Join from PC, Mac, Linux, iOS or Android: Zoom link Links to an external site. Passcode: 654321

Or Telephone:
Dial: +1 720 707 2699 (US Toll)
Meeting ID: 969 8323 3516, Passcode: 654321

Recorded lectures: Canvas

Course Description

1. This course will study the fundamental concepts of Spacecraft Design with emphasis on the important aspects of systems and subsystems engineering
2. A preliminary design for two missions will be developed, documented and presented at a Preliminary Design Review (PDR) at the end of the semester by students working in teams
3. Design teams will compete for the winning design to be selected, following the PDR, by the Instructors

Students will participate as distributed team members, requiring each team to accommodate and coordinate with their distance team member(s) as necessary.

Curriculum

This is a lecture and project-based course centered on developing and presenting the spacecraft preliminary design for a spaceflight mission. Individual lectures cover the spacecraft systems and subsystems. The course assumes the student has no previous experience in spacecraft design. Students are assigned to teams by the instructors in order to balance out team skills in order to complete the design. Section 1 students are required to attend in person in order to foster discussion.

Course Objectives

1. To convey the important aspects of systems and subsystems engineering
2. To undertake a realistic spacecraft design process
3. To develop the preliminary design for a spacecraft

Content

SYSTEMS ENGINEERING

MISSION DESIGN

COMMAND, TELEMETRY & SEQUENCING

COMMAND & DATA HANDLING SUBSYSTEMS

POWER & ELECTRICAL SUBSYSTEMS

THERMAL SUBSYSTEMS

TELECOMMUNICATION SUBSYSTEMS

FLIGHT & SIMULATION SOFTWARE SUBSYSTEMS

GUIDANCE, NAVIGATION & CONTROL SUBSYSTEMS

PROPULSION SUBSYSTEMS

STRUCTURES & MECHANISMS SUBSYSTEMS

FAULT PROTECTION

ASSEMBLY, INTEGRATION & TEST

MISSION OPERATIONS

Grading

The course grade will be based on homework, Conceptual Design Review (CoDR) Presentation, Preliminary Design Review (PDR) Presentation, Design Documentation and Instructors' Assessment. A guest reviewer from industry or a NASA institution will participate in reviews on a non-grading basis.

All homework assignments must be type-written submissions as PDF documents except when an Excel spreadsheet is required, as for the first homework. No hand-written homework submissions will be accepted. Supporting excel or numbers spreadsheets are acceptable on numeric assignments.

The use of any sort of AI for diagrams, text, or materials of any sort is ***expressly prohibited*** and will result in the rejection of the assignment and an automatic zero.

Homework	20%	10% per day de homework acce lowest *2* grade
CoDR Presentation	20%	Project Manage present
PDR Presentation & **Design Document**	40%	All team membe
Instructor Evaluation	20%	
Bonus	5% pts	Winning team fo

Spring Break, March 24-28

Classroom Behavior and Attendance

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy is to be practiced at all times. For more information, see the classroom behavior policy, the Student Code of Conduct, and the Office of Institutional Equity and Compliance.

Students in the in-class section are required to be present for lectures. Student interaction is vital, with students providing questions, answers, comments, and experience as part of the learning process. Student missing class will be given access to the online section video upon providing a valid reason for the absence to the instructors. Students are encouraged to prearrange absences for valid reasons listed below.

Policy on illness

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. University policy is given here.

Students in the in-class section who miss class due to illness will be given access to the on-line section video of the lecture. Inform you instructors of the reason for your absence in order to gain access to the video.

Policy on absence

Students in the in-class section will be given access to the video of a missed class upon providing a valid reason for the absence. Valid reasons include, but are not limited to, illness, family emergency, and conflicts with another class activity or certification. Please discuss with your instructor any other reasons for absence you feel may be applicable.

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

Preferred Student Names

Students may update their preferred names and other information via the student portal. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution (honor@colorado.edu); 303-492-5550). Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, protected-class discrimination and harassment, and related retaliation by or against members of our community on- and off-campus. These behaviors harm

individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email cureport@colorado.edu. Information about university policies, reporting options, and support resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of any issues related to these policies regardless of when or where they occurred to ensure that individuals impacted receive information about their rights, support resources, and resolution options. To learn more about reporting and support options for a variety of concerns, visit Don't Ignore It.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance.

See the campus policy regarding religious observances for full details.