

ASEN 5148 Spacecraft Design

Syllabus Spring 2022

Instructors	Dr. Daniel Kubitschek Laboratory for Atmospheric and Space Physics - LASP Space Technology Building 1234 Innovation Drive, Boulder, CO 80303 303-735-2130 daniel.kubitschek@lasp.colorado.edu Dr. Chris Grasso Blue Sun Enterprises, Inc. 1942 Broadway Street Suite 314 Boulder, CO 80302 cgrasso@bluesunenterprises.com
Office Hours:	Fridays, by appointment Zoom:
Course Website	Canvas
Textbook	<i>Spacecraft Systems Engineering – 4th Edition</i> – Fortescue, Swinerd & Stark
Lectures	11:30 am – 12:45 pm MT Tu/Th Classroom: AERO 111 (after 24 JAN 2022) Join from PC, Mac, Linux, iOS or Android: Or Telephone: Dial: +1 646 558 8656 (US Toll) Meeting ID: 737 998 4488 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 three missions will be developed, documented and presented at a Preliminary Design Review (PDR) at the end of the semester
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 video lecture and project-based course centered on developing and presenting the spacecraft preliminary design for a spaceflight mission. Individual video lectures cover the spacecraft systems and subsystems. The course assumes the student has no previous experience in spacecraft design.

Course Objectives

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

Content

SYSTEMS ENGINEERING

MISSION DESIGN

COMMAND & TELEMETRY

COMMAND & DATA HANDLING SUBSYSTEMS

POWER & ELECTRICAL SUBSYSTEMS

THERMAL SUBSYSTEMS

TELECOMMUNICATION SUBSYSTEMS

FLIGHT & SIMULATION SOFTWARE SUBSYSTEMS

GUIDANCE, NAVIGATION & CONTROL SUBSYSTEMS

PROPULSION SUBSYSTEMS

STRUCTURES & MECHANISMS SUBSYSTEMS

SEQUENCING

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

Homework	20%	Late homework submission requires instructor consent
CoDR Presentation	20%	All team members shall present
PDR Presentation & <u>Design Document</u>	40%	All team members shall present
Customer Evaluation	20%	
Bonus	5% pts	Winning team for each Project

Spring Break, March 20-26, 2022

The week of March 22-26 will be used in this class as a spring pause to provide us all with a safe and supportive way to promote health, wellness and learning without leaving campus. During this week, we won't have any exams or assignments due. We will still have class with interactive class activities that will require your attendance and be part of your final course grade. While March 25 is a wellness day, attendance is still required for all other class sessions that week. We wish we could take a regular spring break, but public health concerns prevent us from doing so. We would like to emphasize that it is still important for you all to behave responsibly. Do not use the week to travel or engage in risky behavior that could result in an outbreak on campus after we all return.

Accommodation for Disabilities

All faculty assume responsibility for ensuring that their individual courses and content are accessible to all students. Please utilize principles of Universal Design when creating new courses; otherwise, make appropriate alterations to existing material to accommodate students who require assistance. You may contact our Universal

Instructional Design Consultant on [the Academic Technology Design Team](#) in the Office of Information Technology for more information by calling 303-735-4357 (5-HELP).

Faculty consultations with an Access Coordinator in [Disability Services](#) serve as an opportunity to provide clarity and guidance regarding the implementation of accommodations and working with students with disabilities. To request an appointment with an Access Coordinator, contact Disability Services at dsinfo@colorado.edu or 303-492-8671

Disabilities syllabus statement:

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 or injury, see [Temporary Medical Conditions](#) under the Students tab on the Disability Services website.

Classroom Behavior

Faculty and students should be aware of the campus [Classroom and Course-Related Behavior policy](#) which describes examples of unacceptable classroom behavior and provides information on how to handle such circumstances should they arise. Faculty are encouraged to address the issue of classroom behavior in the syllabus, and to understand their [professional rights and duties](#).

Classroom behavior syllabus statement:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to

discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on [classroom behavior](#) and the [Student Code of Conduct](#).

Honor Code

The Boulder campus has an [Academic Integrity Policy](#) and a [student Honor Code](#); individual faculty members are expected to familiarize themselves with its tenets and follow the approved procedures should violations be perceived. The campus has been working diligently to make this process work better and to provide guidance on 'gray areas' at the [Honor Code website](#).

Honor Code syllabus statement:

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: 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 the Honor Code (honor@colorado.edu; 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the [Honor Code Office website](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

Office of Institutional Equity and Compliance (OIEC) syllabus statement:

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, [anonymous reporting](#), and the campus resources can be found on the [OIEC website](#).

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Holidays

It is the responsibility of every instructor to explain clearly her or his procedures about absences due to religious observances in the course syllabus so that all students are fully informed, in writing, near the beginning of each semester's classes. [Campus policy regarding religious observances](#) states that faculty *must* make reasonable accommodations for students and in so doing, be careful not to inhibit or penalize those students who are exercising their rights to religious observance. Faculty should be aware that a given religious holiday may be observed with very different levels of attentiveness by different members of the same religious group and thus may require careful consideration to the particulars of each individual case.

For more information on the religious holidays most commonly observed by CU Boulder students consult the [online interfaith calendar](#).

Religious observances syllabus statement:

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.