Syllabus – ASEN 5148

Spacecraft Design

**Instructors** Dr. Daniel Kubitschek

Laboratory for Atmospheric and Space Physics -- LASP

Space Technology Building

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**Office Hours:**  Fridays, by appointment

Zoom (<https://cuboulder.zoom.us/j/9268576553>)

**Course Website** D2L

**Textbook** *Elements of Spacecraft Design*  -- Charles D. Brown

**Lectures** 0930-1045 am Monday and Wednesday

Classroom ECCS 1B12

Recorded lectures: http://cuengineeringonline.colorado.edu/

**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 real missions (SolarCube & ClipSat) will be developed and presented at a Preliminary Design Review (PDR) at the end of the semester
3. Design teams (3 teams per project) will compete for the winning design to be selected, following the PDR, by the instructor and the customer teams (High Altitude Observatory & Blue Sun Enterprises, Inc.)

Distances student taking the course for CU academic credit 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 discussion 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.

**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 small spacecraft

**Content**

MISSION DESIGN

SYSTEMS ENGINEERING

CONCEPTUAL DESIGN REVIEW

COMMAND & DATA HANDLING SUBSYSTEMS

POWER & ELECTRICAL SUBSYSTEMS

THERMAL SUBSYSTEMS

TELECOMMUNICATION SUBSYSTEMS

FLIGHT & SIMULATION SOFTWARE SUBSYSTEMS

ATTITUDE DETERIMATION & CONTROL SUBSYSTEMS

PROPULSION SUBSYSTEMS

STRUCTURES & MECHANISMS SUBSYSTEMS

FAULT PROTECTION

ASSEMBLY, INTEGRATION & TEST

OPERATIONS

**Grading**

The course grade will be based on homework, CoDR Presentation, PDR Presentation, Design Documentation and Customer Assessment

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| --- | --- | --- |
| Homework | 10% | Late homework submission requires instructor consent |
| CoDR Presentation | 20% | All team members shall present |
| PDR Presentation | 30% | All team members shall present |
| Design Documentation | 20% | Delivered to Customer |
| Customer Evaluation | 20% |  |
| Bonus | 5 pts | Winning team for each Project |

**Honor Code**

All work submitted is assumed to have been completed in accordance within the letter and spirit of the Honor Code and pledge, even if the pledge is not specifically requested. More information is available at: [http://www.colorado.edu/academics/honorcode/](http://www.colorado.edu/academics/honorcode/" \t "_blank)

**Students with Disabilities**

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed.  Disability Services determines accommodations based on documented disabilities - (303-492-8671, Willard 322, [www.Colorado.EDU/disabilityservices](http://www.Colorado.EDU/disabilityservices)).

**Religious Observation**

I respect individuals’ rights to follow their own religious expression. Please let me know if a religious observation conflicts with a due date. See full details of official campus religious policy at <http://www.colorado.edu/policies/fac_relig.html>

**Sexual Harrassment**

The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty.  Sexual harassment is unwelcome sexual attention.  It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combination of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall.  Any student, staff or faculty member who believes s/he has been sexually harassed should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550.

Information about the ODH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at: <http://www.colorado.edu/odh/>