SPACE SYSTEMS DESIGN – EAS 4530 (DRAFT)

Class Periods: MWF, 6th (12:50 – 1:40 PM)

Location: WEIL 020273

Academic Term: Spring 2026

Instructor

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Office Hours: 8th MW (official) – open door policy in effect, make an appointment

Teaching Assistant/Peer Mentor/Supervised Teaching Student

- N/A

Course Description

A discussion of the component systems of a spacecraft and a typical mission's requirements. The operation and character of different spacecraft hardware is presented as well as typical mission timelines from early conception to final operations. Topics include the space environment, guidance/control/navigation systems, spacecraft sensors and actuators, propulsion systems, thermal systems, power systems, launch systems, communication systems, structural systems and mission operations. This course is useful to engineers, scientists, computer scientists and any profession that uses data.

Course Pre-Requisites / Co-Requisites

EAS 4510 (Astrodynamics) or lecturer approval

Course Objectives

To introduce students to the fundamentals of spacecraft design including mission design, subsystem/component analysis and design, and systems engineering. Additionally, the tools utilized in the design process (e.g., Gantt charts, milestone charts, organizational charts, flow diagrams) and the design review cycles (e.g., PDRs, FDRs) will be introduced and utilized. Specific objectives include:

1. Obtaining a fundamental understanding of the spacecraft design process;
2. Understanding/appreciating the multi- & inter-disciplinary aspects of design;
3. Working in a team environment while also having individual tasks;
4. Practicing oral and written technical communications skills;
5. An appreciation and understanding of engineering ethics.

Required Textbooks and Software

J. Wertz and W. Larson, eds., Space Mission Analysis and Design, 3rd Ed., Microcosm Press

Recommended Textbooks

- M. D. Griffin and J. R. French, Space Vehicle Design, AIAA Educational Series.
- V. Pisacane and R. Moore, eds. Fundamentals of Space Systems, Oxford Univ. Press.
- P. Fortescue and J. Stark, eds., Spacecraft System Engineering, John Wiley and Sons.
- J. J. Sellers, Understanding Space, An Introduction to Astrodynamics, McGraw-Hill.
- A. Houston and M. Rycroft, Keys to Space, An Interdisciplinary Approach to Space Studies, McGraw-Hill.

Recommended Documents

- NASA Systems Engineering Handbook; 2007
- SMC Systems Engineering Primer & Handbook, 2004
- Defense Acquisition University Systems Engineering Fundamentals; 2001

Course Schedule

Concepts	Text (SMAD)
Systems Engineering Process & Requirements: Discuss concepts of systems analysis & design	Chap 1
Spacecraft Mission Design: List and define elements of a space mission concept; list and define the typical design reviews associated with space systems design	Chaps 1 & 2
Space Environment: Discuss environmental factors which affect S/C operation	Chap 8
Orbits & Constellation: Discuss orbits and constellations as they affect mission requirements	Chap 7
Attitude Dynamics & Control: Discuss basics of attitude determination and control, attitude maneuvers and momentum exchange devices – attitude errors and control laws, momentum management, momentum bias	Chap 11 and notes
Other Subsystems: Payload, CD&H, Comms (TT&L), Power, Propulsion	Chap 11

Homework Assignments

Problems will be assigned regularly and will be periodically collected with an advance notice of two (2) days. Late homework **will not** be accepted. **Quizzes will be administered without warning at the discretion of the instructor.** All assignments and related lecture materials will be posted under the ***Announcements*** **tab**.
Assignments, documentation, and presentations are group activities; however, exams are individualized activities.

Evaluation of Grades

Activity	Percentage of Final Grade
Assignments & Documentation	25%
Presentations	25%
Exam	20%
Peer Evaluations	15%
Other (current/historical events)	15%

Grading Policy

Percent	Grade	Percent	Grade	Percent	Grade
90.0 - 100.0	A	87.0 - 89.9	A-	84.0 - 86.9	B+
81.0 – 83.9	B	78.0 - 80.9	B-	75.0 - 77.9	C+
72.0 – 74.9	C	69.0 - 71.9	C-	66.0 - 68.9	D+
63.0 - 65.9	D	60.0 - 62.9	D-	0 - 59.9	E

More information on UF grading policy may be found at: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu