Design of Space Vehicles and Systems I

AEROENG 4517

**Description / Conditions**

Transcript Abbreviation:
Des Spc Veh Sys I

Course Description:
Feasibility study of a space mission, elements of mission design and design methodologies of spacecraft subsystems, and preliminary sizing.

Course Levels:
Undegraduate (1000-5000 level)

Designation:
Required

**Course Detail**

Credit Hours (Minimum if “Range” selected):
3.00

Max Credit Hours:
3.00

Check if Repeatable:
Off

Maximum Repeatable Credits:
3.00

Allow Multiple Enrollments in Term:
No

Course Length:
14 weeks (autumn or spring)
12 weeks (summer only)

Off Campus:
Never
Campus Location:
Columbus

Instruction Modes:
In Person (75-100% campus; 0-24% online)

Prerequisites and Co-requisites:
Prereq: 3521 and 3543 and 3570 and 3580, and Sr standing, and enrollment as AeroEng-BS student (No pre-majors can enroll in this course). Prereq or concur: 4550.

Electronically Enforced:
No

Course Goals and Learning Objectives

Course Goals / Objectives:
Provide students with conceptual and preliminary spacecraft design experience
Foster multidisciplinary thought processes and collaborations
Train students in effective teamwork
Refine students' technical communication skills through written reports and presentations

Check if concurrence sought:
No

Contact Hours

<table>
<thead>
<tr>
<th>Topic</th>
<th>LEC</th>
<th>REC out-of-class</th>
<th>REC in-class</th>
<th>Weekly LAB in-class</th>
<th>Weekly LAB out-of-class</th>
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<tbody>
<tr>
<td>Form design teams, design project description, process of requirements definition and a requirements baseline development for a space mission. Introduction to Space Systems Engineering</td>
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<tr>
<td>Characteristics of satellite Com systems, baseband signals and service quality, types of signals and their qualities</td>
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<td>Communication techniques: carrying the baseband signals at distance with constraints, analogue and digital signals, modulation and demodulation techniques, coding, bandwidth</td>
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<td>Link performance, communication payload. 1st progress report and presentation</td>
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<td>Orbits and related issues. Planetary observations, pointing and and mapping geometry from space. Space propulsion systems and design</td>
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<td>The platform: spacecraft subsystems, spacecraft Subsystems.</td>
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<td>Spacecraft preliminary design and sizing.</td>
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<td>Spacecraft thermal systems and design</td>
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<td>Spacecraft attitude determination and control, disturbances modeling 2nd Progress report and presentation</td>
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<td>Spacecraft structural design: issues and topics of structural design for space systems, design elements and verification requirements</td>
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<td>Optimum Structural design: FEA with Hypermesh and Nastran</td>
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<td>Limit Analysis and Design of Structures: FEA with Hypermesh and Nastran. FEA- truss, beam and frame structures; Optional: Geometric Modeling with primitives</td>
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<td>Minimum Stress Design: fully stress design, FEA with Hypermesh and Nastran.</td>
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**Grading and Texts**

Grading Plan:
Letter Grade

Course Components:
Lecture
Lab

Grade Roster Component:
Lecture

Credit by Exam (EM):
No

Grades Breakdown:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Percent</th>
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<tr>
<td>1st Oral and written Progress Report-Team (4th week)</td>
<td>10%</td>
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<tr>
<td>2nd Oral and written Progress Report-Team (9th week)</td>
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<tr>
<td>3rd Oral and written Progress Report(structural design project )-Team (14th week)</td>
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<tr>
<td>6 Announced Quizzez: 5 % each</td>
<td>30%</td>
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## ABET Student Learning Outcomes

### Embedded Literacies (UG courses only)

Embedded Literacies Info:

## Attachments / Additional Notes or Comments

ABET Syllabus:  
[ABOENG_4517_ABET.pdf](AEROENG_4517_ABET.pdf)