Design of Space Vehicles and Systems II

AEROENG 4518

Description / Conditions

Transcript Abbreviation:
Des Spc Veh Sys II

Course Description:
Continuation of 4517: Preliminary and detailed design of space vehicle components. Design of a space vehicle/system, and mission scenarios simulation via computer software.

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: 4517, and enrollment as AeroEng-BS student (No pre-majors can enroll in this course).

Electronically Enforced:
No

Course Goals and Learning Objectives

Course Goals / Objectives:
Provide students with conceptual and detailed 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

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>Minimum Buckling Load Design</td>
<td>0</td>
<td>0</td>
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<tr>
<td>FEA with Hypermesh and Nastran (FEA - Truss, Beam and Frame Structures), Frame and Rotating Beam</td>
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<td>Low Cycle/High Cycle Fatigue Design</td>
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<td>FEA - Plates and Shells</td>
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<td>FEA - Solid Bodies</td>
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<tr>
<td>Structural Integration and component mode synthesis of rigid and flexible appendages to main flight vehicle body for total vehicle structural dynamic analysis and design</td>
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<tr>
<td>Spacecraft maneuver and attitude dynamics and control system design; actuators and sensors; pulsewidth modulation; launch-on-orbit operational modes, planet and sun acquisition; momentum dumping; closed-loop attitude simulation</td>
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Cost analysis and estimation methods, assessment of space environment

STK/ODTK, MATLAB, MATLAB SIMULINK: orbit, attitude, propulsion, power, communication subsystems, coverage and access, sensors integration; space weather

ANSYS, NX-IDEAS: structural and thermal analysis of configuration

Total

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<td>power, communication subsystems, coverage and access, sensors</td>
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<td>integration; space weather</td>
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**Grading and Texts**

Grading Plan:
Letter Grade

Course Components:
Recitation
Lecture
Lab

Grade Roster Component:
Lecture

Credit by Exam (EM):
No

Grades Breakdown:

<table>
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<th>Aspect</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Progress Reports 1</td>
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<tr>
<td>Progress Reports 2</td>
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<tr>
<td>Final Oral Presentation</td>
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<tr>
<td>Final Design Poster</td>
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<tr>
<td>Final Formal Report</td>
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Representative Textbooks and Other Course Materials:

<table>
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<tr>
<th>Title</th>
<th>Author</th>
<th>Year</th>
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<tr>
<td>Spacecraft Structures and Mechanisms by Microcosm Press</td>
<td>Sarafin (editor)</td>
<td>Microcosm Press</td>
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</table>
ABET Student Learning Outcomes

Embedded Literacies (UG courses only)

Embedded Literacies Info:

Attachments / Additional Notes or Comments

ABET Syllabus:  
AEROENG_4518_ABET.pdf