Design of Atmospheric Flight Vehicles I

AEROENG 4515

Course Description:
Conceptual and preliminary design, methodology, case studies, introduction of design software, group planning for subsequent design effort: design of atmospheric flight vehicles and components.

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

Overview of the design process

Vehicle Specifications: Mission Profile / RFP / FAR specs

Preliminary weight estimation

Trade Studies

Sizing: Thrust-to-Weight Ratio and Wing Loading

Aerodynamics review, wing and airfoil selection

Sizing: Fuselage, Tail, Engine

Propulsion integration

Structural considerations in aircraft layout

Landing gear sizing and layout

Crew, passenger, and payload layout

Environmental impacts

Team Presentations

Structural design: Design variables, Objective functions, Constraints

Problem statements of Optimal Structural Design problems

Limit Analysis and Design of Structures

Minimum Stress Design: Fully Stress Design

Minimum Weight Design
**Grades Breakdown:**

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Midterm presentation</td>
<td>20%</td>
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<tr>
<td>Final Presentation</td>
<td>20%</td>
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<tr>
<td>Final Report</td>
<td>40%</td>
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<tr>
<td>Homework</td>
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<td>Quizzes</td>
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**Designation:**

Required

**Instruction Modes:**

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

**Representative Textbooks and Other Course Materials:**

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