Design of Atmospheric Flight Vehicles I

AEROENG 4515

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

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.

Prerequisites and Co-requisites:
Prereq: 3543 (543) and 3570 (530 and 570) and 3521 (521) and 3580 (580), and Sr standing, and enrollment as AeroEng-BS student (No AAE pre-majors can enroll in this class). Prereq or concur: 4550 (550).

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
- Teach students the importance of considering engineering standards in the design process.
Course Topics:
- Overview of the design process
- Vehicle Specifications: Mission Profile / RFP / Engineering Standards
- 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, Multiple constraints
- Problem statements of Optimal Structural Design problems
- Limit Analysis and Design of Structures
- Minimum Stress Design: Fully Stress Design
- Minimum Weight Design

Designation:
Required