# THE OHIO STATE UNIVERSITY

## **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 flght 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

#### **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

#### **Designation:**

Required