

Course Title	Course Code	Credit Hours
Aircraft Design	AE-424	2-2

Textbook:

- Daniel P. Raymer, "Aircraft Design: A Conceptual Approach", AIAA Education Series

Reference Books/Materials:

- Mohammad H. Sadraey, "Aircraft Design-A Systems Engineering Approach", Wiley
- Leland M Nicolai, "Fundamentals of Aircraft and Airship Design, Volume 1: Aircraft Design", AIAA Education Series
- Ajoy Kumar Kundu, "Aircraft Design", Cambridge Aerospace Series
- Jay Gundlach, "Designing Unmanned Aircraft Systems: A Comprehensive Approach", American Institute of Aeronautics and Astronautics
- EASA Part-66 Category B1 Maintenance License Module 7, "Maintenance Practices"
- EASA Part-66 Category B1 Maintenance License Module 11, "Aircraft Aerodynamics, Structure and Systems"
- Aviation Maintenance Technician Certification Series, "Turbine Aeroplane Structures and Systems"

Course Objectives:

This course aims to introduce students to the conceptual Design of Aircraft, covering design layout, configuration, and analysis. It includes topics such as Aerodynamics, Propulsion, Structures, Stability, Control, and performance Tradeoff studies.

Course Outline:

- Conceptual Design of Various Aerospace Vehicle Types and Categories
- Rough Weight Sizing, Airfoil and Wing/Tail Geometry Selection
- Airfoil Selection, Stall Characteristics, and Wing Geometry Parameters (AR, Sweep, Taper Ratio)
- Dihedral, Wing Tip, and Vertical Location Selection for Wings and Tail

- Tail Configuration and Geometry, Thrust-To-Weight Ratio, and Wing Loading Calculations
- Initial and Refined Sizing, Including Fuel Weight Estimation and
- Geometry Sizing for Fuselage, Wing, Tail and Control Surfaces, Including
- Special Considerations in Aerodynamics, Structural Integrity, Radar Detectability and Cabin Management
- Propulsion and Fuel System Integration, Including Engine Dimension Estimation and Propeller Sizing
- Aerodynamics Coefficient Determination, Drag and Lift Characteristics Using CFD
- Propulsion Analysis: Rubber and Fixed Engine Sizing, Intake and Propeller Design
- Structural and Load Analysis: Load Categories, Material Selection, Truss Analysis, and V-N Diagrams
- Longitudinal and Lateral Stability Calculations, Trim Analysis
- Drag Polar Plot, Range, Endurance, Takeoff and Landing Distance Calculations
- Sizing and Trade Studies, Including Matrix Analysis and Optimization Techniques