



Course Title: AIRCRAFT DESIGN

Credit Units: 04

Course Code: AERO309

Course Level: UG

L	T	P/S	SW/ FW	TOTAL CREDIT UNITS
3	1	-	-	4

Course Objectives

This course is to make the students understand various design requirements, including those laid down by the DGCA, both structural and aerodynamic design considerations, for different types of airplanes and how the design of an airplane is guided by its performance requirements as covered by the V-n diagram for both civil and military type airplanes.

Pre-requisites: Aerodynamics - II, Aircraft Structures - II and Propulsion II

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction to Aircraft Design	15
Descriptors/Topics Conceptual design, preliminary design. Design requirement & mission specification. Identification of mission profile and fuel weight estimation. Fuel weight estimation for a specified missions-commercial & combat. Design of aircraft using composites.	
Module II : Aerodynamic Design of airplane	35
Descriptors/Topics : Wing loading selection for various flight segments. Selection of wing planform & aerofoil selection. Design considerations for fuselage design. Configuring fuselage design for a specific mission. Preliminary design for horizontal & vertical –tail configurations & sizing. Types of drag & estimation methods for aircraft drag estimation.	
Module III : Structures & Loads	15
Descriptors/Topics : Structural design criteria, definitions of loads, airplane design loads. Load factor & V-n diagram with & without gust loads. flight vehicle materials; then propellers criteria for material selection.	
Module IV : Aircraft systems; Airplane performance	35

Descriptors/Topics : Air worthiness requirements , cost estimation. General discussion on aircraft system. Landing gear systems: wheel arrangement & shock absorber system. Propulsion systems, relative performance of various engines. Criteria for propulsion system section sizing & placement. Take off & landing distance estimation. Air worthiness standards related to configuration design, engine selection and composite applications. Identification of various components which make up the total cost of aircraft DAPCA-model of cost estimation.

Student Learning Outcomes:

- Design aircraft and it’s components for various flight conditions / flight-envelope for Civil & military applications.
- Analyse Fuel weight estimation for different phases of aircraft
- Define the velocity and load factor limiting conditions for the aircraft.
- Estimate various performance parameters during takeoff, landing, cruise and climb.
- Identify of Propulsion system, wings and other factors based on mission profile
- Evaluate cost and airworthiness factors

Pedagogy for Course Delivery: Session Plan / course-material uploading, Class-room teaching associated with assignments, presentations, quiz, viva-voce and evaluation.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
100	NA	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment - 30					End Term Examination
Components (Drop down)	A	CT	S/V/Q	HA	70
Weightage (%)	5	10	8	7	70

Text & References:

- Daniel P Raymer, “Airplane Design-A Conceptual Approach”, AIAA Education Series, 1999.
- D. Stinton, “The Design of Airplane”, GRANADA, UK, 2000.
- Nikolai L.M., “Fundamentals of Aircraft Design”, Univ. of Dayton Ohio, 1975.
- Thomas C Corke, “Design of Aircraft “ Pearson Education -2004.

- John P Fielding, "Introduction to Aircraft Design" Cambridge University Press-1999.

Any other Study Material:

-