

Introduction to Aerospace Engineering

Semester No 1	Code AE-102	Credit Hours 2-0
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TEXT AND MATERIAL:

Textbook (s):

Introduction to Flight by John D. Anderson, McGraw-Hill, NY, 8th Edition, 2016.

Reference Material:

1. Military Avionics Systems by Ian Moir and Allan Seabridge, Aerospace Series, 2006.
2. Interactive Aerospace Engineering and Design by Dave Newman, 2002.
3. Aircraft Systems - Mechanical, electrical, and avionics subsystems integration by Ian Moir and Allan Seabridge, John Wiley & Sons Inc, 3rd Edition, 2008.
4. Aircraft Propulsion by Saeed Farooqui, 2nd Edition, 2014.

PREREQUISITE:

NIL

COURSE DESCRIPTION:

This course presents an overview of aerospace engineering disciplines; the history of aerospace, fundamental elements of aerodynamics and astrodynamics, aerofoils and wings, performance, stability and control, propulsion, structures and avionics leading towards the aerospace vehicle conceptual design. The course is also meant to provide students with an engineering background suitable for subsequent course work in aerospace engineering and to discuss the nature of future coursework and expectations of faculty from the students. Visits to different engineering centres are included to familiarize students with working environment of maintenance facilities.

COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student should be able to:

S No	CLO Statement	PLO	Learning Domain and level
1	Gain the fundamental knowledge of aerospace engineering and technology pertaining to history and modern times. Describe aircraft aerodynamic parameters and structural engineering involved.	1	C1
2	Comprehend the fundamental knowledge of aircraft propulsion system, stability and control, avionics system, hydraulic system and electrical system.	2	C2

ASSESSMENT SYSTEM:

Quizzes	10 - 15%
OHTs	30 - 40%
Assignments	5 - 10%
ESE	40 - 50%

TOPICS COVERED WITH THEIR CONTRIBUTION TO PLOs:

Week No	Description	Ref	Quizzes	Assignmen	CLO
1	A Brief History of flight Balloons (Lighter than Air Machines) Heavier-than-air flight Fixed Wing (Jet Aircraft, Commercial Air Transport, General Aviation) Rotary Wings (Helicopters)Flapping Wings	Text 1 Chapter No1	01	01	1
2	Introduction of Aerodynamics Generating Lift Buoyancy Lift Lift from Fluid Air Motion Coefficient of Pressure Coefficient of Lift Coefficient of Drag L/D Ratio versus AoA	Text 1 Chapter No 4			
3	Coefficient of Pitching Moment Sources of drag Profile Drag Skin Friction Drag Induced Drag	Text 1 Chapter No4			
4	Introduction of Aircraft Performance Study and Analysis Airfoil Nomenclature Wing Nomenclature Aircraft Components / Major Parts	Text 1 Chapter No 5 and 6			
5	Aircraft Performance Parameters Steady and Accelerated Flight	Text 1 Chapter No 5 and 6			
6	Aircraft Propulsion Introduction The Propeller The illustrated jet engine Fundamental equations governing jet engines	Reference 4			
7	OHT-1				
	Aircraft Stability and Control Introduction Airplane stability Static forces and moments on aircraft	Text 1 Chapter No7			

8					
9	Introduction Navier – Stokes Equations Computational Fluid Dynamics Wind Tunnel Testing Analytical Solution of Aircraft EoM	Lecture Notes			
10	Introduction to Aircraft Avionics Systems Radar Systems Communication systems on an Aircraft IFF TACAN Navigational Aids (GPS, ADF) ILS HUD MFDs HOTAS	Reference 1	01	01	1
11	Flight Instruments on an Aircraft Pitot-Static System Altimeter ASI VVI G meter Fuel Flow Indicator Warning Panel	Reference 1 4.11			
12	Aircraft Structures Ribs Spars Skin Wing-Fuselage attachment points	Reference 2 Reference 3			
13	OHT-2				
14	Aircraft systems Aircraft Fuel System Aircraft Hydraulic Systems	Reference 2 Reference 3			
15	Aircraft Electrical Systems Aircraft Pneumatic Systems Flight Control Systems Ailerons Elevators Rudders Auto-Pilot Flight Data Recorder Dampers Aircraft Allied Systems Landing Gear Airconditioning Cockpit Pressurization	Reference 2 Reference 3	02		2
16	The Space environment* Introduction of Space Microgravity	Text 1 Chapter No 2 and 8			
17	Revision				
18	END SEMESTER EXAMINATION				