



**Gyanmanjari**  
Innovative University

Course Syllabus  
Gyanmanjari Institute of Technology  
Semester-4 (B.Tech)

**Subject:** Aircraft Systems and Instruments - BETAE14309

**Type of course:** Professional Elective Courses

**Prerequisite:** Basic knowledge of aerodynamics, propulsion, and electrical fundamental

**Rationale:** This subject provides fundamental knowledge of various aircraft systems and instruments essential for safe and efficient operation. It helps students understand the working principles, functions, and interconnections of mechanical, hydraulic, pneumatic, electrical, and electronic systems used in modern aircraft

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	0	2	4	60	30	10	20	30	150

*Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.*



**Course Content:**

Unit No	Course content	Hrs.	% Weightage
1	<b>Aircraft Systems:</b> Introduction, Classification of Aircraft Systems, Hydraulic System, Pneumatic System, Brake System, components, Landing Gear Systems Classification –Shock absorbers – Retractive mechanism.	11	25 %
2	<b>Engine Systems:</b> Lubrication System, Fuel System, Engine Cooling Systems, Ignition and Starting System, Induction and Exhaust Systems, Typical Aircraft Bleed Air System, Turbocharger System, and Propeller System.	11	25 %
3	<b>Auxiliary Systems:</b> Ice and Rain Protection Systems, Fire Protection System, Cabin Environmental Control System, Electrical System & APU.	10	15 %
4	<b>Aircraft Instruments Introduction:</b> Introduction Types of Instrument Panels, Electronic Flight Display (Glass Cockpit), Flight Instruments: Accelerometers, Airspeed Indicators, Mach Meters, Altimeter, Magnetic Compass, Trim Tab Indicator, Flap Position Indicator, Angle of Attack Indicator, Outside Air Temperature (OAT) Gauge, Navigation Instruments, Engine Instruments: Tachometers, Temperature Gauges (EGT, CHT), Pressure Gauges, Air Data Computer (ADC)	13	35 %

**Continuous Assessment:**

Sr. No	Active Learning Activities	Marks
1	<b>Engine system Layout:</b> Students will work individually to design a schematic diagram of any one engine system such as the fuel, lubrication, or ignition system. They will explain each component, its function, and interconnection within the system. Students will upload a PDF on the GMIU portal with the aircraft name, a short report on its major systems, and how they work together.	10
2	<b>Individual / Group Presentation:</b> Students will prepare and deliver a short seminar or PowerPoint presentation on topics such as “Glass Cockpit Technology,” “Electronic Flight Displays,” “Air Data Computer,” or “Engine Monitoring Instruments. Students will upload their PowerPoint (PPT) and a short report (PDF) on the GMIU Portal.	10





3	<b>Landing Gear Case Study:</b> Students will choose any one aircraft (like Airbus A320 or Boeing 737). They will write a short report on how the landing gear works how it goes up and down and how the brakes stop the aircraft after landing. A PDF file with a few lines of explanation and a simple diagram or photo of the landing gear system upload on GMIU Portal	10
Total		30

**Suggested Specification table with Marks (Theory):60**

<b>Distribution of Theory Marks</b> (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	50%	30%	20%	-	-	-

**Course Outcome:**

After learning the course, the students should be able to:	
CO1	Understand and classify aircraft systems hydraulic, pneumatic, brake, and landing gear along with their components and operation.
CO2	Analyze engine systems such as lubrication, fuel, cooling, ignition, induction, exhaust, bleed air, turbocharger, and propeller.
CO3	Understand auxiliary systems like ice/rain protection, fire protection, cabin environment control, electrical systems, and APU for safe aircraft operation.
CO4	Identify and interpret aircraft instruments flight, navigation, engine instruments, electronic displays, and air data systems.



**List of Practical:**

Sr. No	Descriptions	Unit No	Hrs.
1	<b>Study of Hydraulic System:</b> To understand the components and working of an aircraft hydraulic system.	1	4
2	<b>Study of Pneumatic System:</b> To understand the working of pneumatic systems in aircraft.	1	4
3	<b>Landing Gear Mechanism:</b> To study landing gear types and shock absorption.	1	2
4	<b>Engine Cooling, Ignition, and Starting System:</b> Understand engine cooling and ignition systems	2	4
5	<b>Engine Lubrication System:</b> To study the components and operation of an engine lubrication system.	2	4
6	<b>Engine Fuel System:</b> To study the engine fuel supply system.	2	2
7	<b>Study of Fire Protection System and APU:</b> To understand the working of fire protection systems and (APU) in aircraft.	3	2
8	<b>Study of Ice and Rain Protection System:</b> To understand the components and operation of aircraft ice and rain protection systems.	3	4
9	<b>Flight Instrument Panel:</b> To identify and understand aircraft flight instruments.	4	2
10	<b>Electronic Flight Display (Glass Cockpit) Study:</b> To understand the layout and function of a glass cockpit display.	4	2
		Total	30

**Instructional Method:**

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.





**Reference Books:**

- [1] Aircraft Systems: Mechanical, Electrical and Avionics-Subsystem Integration Ian Moir and Allan Sea bridge Wiley India Pvt. Ltd 3rd edition, 2012
- [2] General Hand Books of Airframe and Power Plant Mechanics, U.S. Dept. of Transportation, Federal Aviation Administration, The English Book Store, New Delhi 1995.
- [3] Aircraft Maintenance & Repair, McKinley, J.L., and Bent, R.D., McGraw-Hill, 1993.
- [4] Aircraft Hydraulic Systems William a Neese Himalayan Books 2007.
- [5] Aircraft Instruments and Integrated Systems Pallet, E.H.J Longman Scientific and Technical 1996

