



Course Title: INTRODUCTION TO AUTOMATIC FLIGHT CONTROL

Credit Units: 03

Course Code: AERO410

Course Level: UG

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

Course Objectives

This course is designed to provide adequate knowledge to analyse single and multi-degrees of freedom of a system. The stability-parameters of a system are established using time-domain analysis and frequencies domain analysis.

Pre-requisites: Flight Dynamics

Course Contents/Syllabus:

	Weightage (%)
Module I : Introduction	15
Descriptors/Topics : Open Loop and Closed Loop (Feed Back) control systems. Types of feedback control systems. Laplace's transform.	
Module II : Feedback Control Systems	15
Descriptors/Topics : Transfer function of linear systems. Impulse response of linear systems, Block diagrams of feed back control systems, Multivariable systems. Block diagram algebra.	
Module III : Analysis of Feedback Control Systems	20
Descriptors/Topics : Typical test input signals, Time domain performance characteristics of feedback control systems. Effects of derivative and integral control. Steady State response of feedback control system-steady State error, Frequency response.	
Module IV : System Stability	15

Descriptors/Topics : Routh-Hurwitz Criterion, the Root Locus Method.	
Module V : Auto-pilots	20
Descriptors/Topics : Longitudinal Auto Pilots: Brief description through Block diagrams and Root Locus of Displacement Auto Pilot. Pitch Orientational Control System. Acceleration control system.	
Module VI: Miscellaneous	15
Descriptors/Topics : Fly-By-Wire control system, Instrument Landing System.	

Student Learning Outcomes:

- Describe various types of feedback control systems.
- Analyze various types of responses of feedback control system corresponding to input signals.
- Design automatic flight control systems for auto pilot and fly-by-wire.
- Determine stability of the closed loop and open loop systems.
- Analyze time domain and frequency domain responses for various feedback systems.

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:

- John H. Blacklock, “Automatic Control of aircraft and Missiles”, John Wiley and Sons, 2nd Ed.1990
- Perkins C.D. and Hage R.E., “Airplane Performance Stability and Control”, John Wiley and Sons.
- Bernard Etkins, “Dynamics of Flight Stability and Control”, John Wiley & Sons, 2/Ed 1989
- Robert C. Nelson, ‘Flight Stability and Automatic Control’, McGraw Hill Co, 1989.
- Pallet H.J., “Automatic Flight Control”, B.S. Professionals Books, Oxford, 3rd Ed, 1987.
- Benjamin C. Kuo, “Automatic Control Systems,” Prentice Hall of India, 1992

Any other Study Material:

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