



# DESIGN OF FIXED WING UNMANNED AERIAL VEHICLES

## PROF. SADERLA SUBRAHMANYAM

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IIT Kanpur

**PRE-REQUISITES :** Introduction to Aerodynamics

**INTENDED AUDIENCE :** Undergraduate and postgraduate students

**INDUSTRIES APPLICABLE TO :** DRDO, HAL, Boeing, Airbus, Bell, McDonnell Douglas, UAV Factory, Lockheed Martin

## COURSE OUTLINE :

This course introduces the initial designing and sizing process for rapidly growing fixed – wing UAV technology, integrated with its performance and stability analysis and prototype testing.

## ABOUT INSTRUCTOR :

Prof. Subrahmanyam Saderla obtained his B.Tech (Aeronautical Engineering) from JNTU, Hyderabad in 2008, M.Tech and Ph.D (Aerospace Engineering) from IIT Kanpur during 2010 and 2015 respectively. Later he joined as a postdoctoral fellow in the department of aerospace and software engineering at Gyeongsang National University (GNU), South Korea. At present he is working as an Assistant Professor in the Department of Aerospace Engineering at Indian Institute of Technology Kanpur. His current area of interest lies in real time system identification of unmanned aerial vehicles. His research interests also include design, flight tests and parameter estimation, high angle of attack aerodynamic modelling and dynamic wind tunnel testing as well as experimental flight dynamics, chaotic modelling (of cancer cell growth, seismic data & material properties etc.) using Artificial Neural Networks.

## COURSE PLAN :

**Week 01 :** Introduction to fixed-wing UAVs, Introduction to Design, Basic Design Parameters.

**Week 02 :** Basic Design Parameters contd., Design Algorithm: Case Study, Design Algorithm: Mission Requirements.

**Week 03 :** Design Algorithm: Feasible Design Parameters, Configuration Layout: Airfoil Selection Configuration Layout: Planform Geometry selection

**Week 04 :** Weight and CG Estimation Analytical Parameter Estimation Analytical Parameter Estimation contd.

**Week 05 :** Performance and Stability Analysis Performance and Stability Analysis contd. Performance and Stability Analysis contd.

**Week 06 :** Simulation, Detailed Sizing

**Week 07 :** Estimation of inertial properties using 3D modelling, Prototype Fabrication

**Week 08 :** Wind Tunnel Testing, Aerodynamic Characterization through Wind Tunnel Testing