



INTRODUCTION TO AIRCRAFT DESIGN

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PRE-REQUISITES : Introduction to Aerospace Engineering, Flight Mechanics

INTENDED AUDIENCE : Aeronautical Engineering, Aerospace Engineering, Mechanical Engineering and Automobile Engineering

INDUSTRIES APPLICABLE TO : HAL, NAL, Mahindra Aerospace, ADE, ADA, Airbus, Boeing

COURSE OUTLINE :

This course is designed to provide students an understanding of procedure followed in conceptual design of an aircraft, meeting the user-specified design requirements and safety considerations specified by the aircraft certification agencies. The students will be exposed to types of aircraft and their features, requirements capture, configuration selection, initial sizing, determination of aerodynamic coefficients, constraint analysis, mass break down, types of loads, V-n diagram, Operational issues (noise, emissions, Range-Payload diagram), and life cycle cost analysis. A special feature of this course will be to take the students through a complete exercise in re-sizing and of a baseline civil transport aircraft to meet a specified market requirement. This exercise will be conducted through a series of tutorials which will run all along the course to give the participants a practical feel of conceptual sizing and of an existing civil transport aircraft.

ABOUT INSTRUCTOR :

Prof. Rajkumar S. Pant has Bachelors, Masters and Ph.D. degrees in Aerospace Engineering. His areas of specialization include Aircraft Conceptual Design, Air Transportation, and Optimization. He has been a member of faculty of Aerospace Engineering Department at the Indian Institute of Technology Bombay since December 1989. Prof. Pant is an alumnus of College of Aeronautics, Cranfield University, UK, where he earned his Ph.D. under Commonwealth Scholarship Scheme, IIT Madras, where he did his Masters in Aeronautical Engineering, and PEC Chandigarh where he underwent his undergraduate studies in Aeronautical Engineering. He has also worked for five years in Hindustan Aeronautics Limited in the Design & Engineering Department at Kanpur (3.5 years) and Nasik (1.5 years) Divisions. He has published and presented ~ 220 scientific papers, of which ~ 170 are in international journals and conferences. He has also visited several top ranking institutes and universities all over the world. Prof. Pant was a Visiting Professor at School of Mechanical & Aerospace Engineering at Nanyang Technological University, Singapore in 2015-16, visiting faculty at Department of Aerospace & Ocean Engineering at Virginia Polytechnic Institute and State University in 2010-11, and a visiting researcher at Instituto Tecnológico de Aeronáutica, Brazil in 2012, Texas A&M University in 2011, Cambridge University in 2008, and Imperial College London in 2006. In November 2012, he was appointed as a Special Visiting Researcher under the Science Without Borders program of the Brazilian Government for three years

COURSE PLAN :

Week 1: Introduction to Aircraft Design & Requirements Capture

Week 2: Design Considerations in Airliners, Cargo, and SST

Week 3: Design Considerations in GA and Military Aircraft

Week 4: Aircraft Configuration Design

Week 5: Aircraft Layout Choices

Week 6: Initial Sizing

Week 7: Estimation of Lift Coefficient

Week 8: Estimation of subsonic parasite drag coefficient

Week 9: Constraint Analysis of Military Aircraft

Week 10: Constraint Analysis of Transport Aircraft

Week 11: Aircraft Loads and V-N Diagram

Week 12: Cost Estimation in Aircraft Design