



# INTRODUCTION TO AIRCRAFT DESIGN

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Department of Aerospace Engineering  
IIT Bombay

**TYPE OF COURSE** : New | Elective | UG/PG

**COURSE DURATION** : 12 weeks (20 Jul' 20 - 9 Oct' 20)

**EXAM DATE** : 17 Oct 2020

**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.

**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. Prior to that, he worked at HAL for five years in Kanpur (1984-88) and Nasik (1988-89) divisions in the Design & Engg. Department. Prof. Pant has been a Visiting Professor at School of Mechanical and Aerospace Engineering at Nanyang Technological University, Singapore for a year in 2016. He has been a visiting faculty at Department of Aerospace & Ocean Engineering at Virginia Polytechnic Institute and State University in 2010-11, and a visiting researcher at Instituto Tecnol?gico de Aeron?utica, Brazil in 2012, Texas A&M University in 2011, Cambridge University in 2008, and Imperial College London in 2006. Prof. Pant is an alumnus of College of Aeronautics, Cranfield University, UK, where he earned his Ph.D. under Commonwealth Scholarship Scheme, and IIT Madras, where he did his Masters in Aeronautical Engineering.

**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