

Airplane design (Aerodynamic) - Web course

COURSE OUTLINE

1. Introduction: Various stages in airplane design. Steps in preliminary design.
2. Data collection and preliminary three-view drawing.
3. Revised weight estimation.
4. Optimization of wing loading and thrust loading. Selection of engine.
5. Selection of wing parameters.
6. Selection of fuselage parameters and internal layout.
7. Special considerations for configuration layout. Location of engines and landing gear. Preliminary sizing of empennage. Revised three-view drawing.
8. Estimation of weights of various components. Calculation of c.g. and its shift.
9. Control surface design.
10. Miscellaneous topics. Final three-view drawing. Revised estimation of drag polar and performance calculations. Presentation of results. Cost of airplane. Sizing and trade-off studies.
11. Example of the preliminary design of a jet airplane.

COURSE DETAIL

A Web course shall contain 40 or more 1 hour lecture equivalents.

S.No	Topics	No.of Hours
1	Introduction.	3
2	Data collection and Preliminary three- view.	3
3	Weight estimation.	3
4	Optimization of wing loading and thrust loading and Engine selection.	6
5	Choice of wing parameters.	4
6	Choice of fuselage parameters.	3



NP-TEL

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Aerospace Engineering

Pre-requisites:

1. It is expected that the student has undergone course on Airplane performance.
2. The student should have undergone or concurrently undergoing course on stability and control.

Additional Reading:

1. Wood K.D. "Aerospace vehicle design vol I.& II" Johnson Pub. Co Boulder Colorado 1966.
2. Fielding J.P. "Introduction to aircraft design" Cambridge Univ. press 1999.
3. Jenkinson L. R., Marchman III J. F. "Aircraft design projects" Butterworth-Heinemann 2003.

Coordinators:

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7	Special consideration for configuration lay-out.	4
8	Weights and centre of gravity.	2
9	Control surface design.	3
10	Miscellaneous topics.	6
11	An example of airplane preliminary design procedure-jet transport.	3

References:

1. Lebedinski. A.A. "Aircraft design - parametric studies" Published by I.I.Sc Bangalore 1971.
2. Nicolai L "Fundamentals of aircraft design" Univ. of Dayton Ohio, 1975
3. Torenbeek. E. "Synthesis of subsonic airplane design" Delft University Press 1981.
4. Roskam, J "Airplane design Vol. I-VIII" Roskam aviation and Engg. Corp. Ottawa, 1989
5. Jenkinson L. R., Simpkin P. and Rhodes D. "Civil jet aircraft design" Arnold 1999.
6. Howe, D. "Aircraft conceptual design synthesis" Professional engineering publishing limited, London, 2000.
7. Raymer, D.P. "Aircraft design a conceptual approach" AIAA educational series fourth edition 2006.