



Luftfahrzeugauslegung *(Aircraft Conceptual Design)*

Degree program: Mechanical Engineering diploma degree / bachelor degree

Program module: MB-LRT-02 - Grundlagen der Luft- und Raumfahrttechnik
(Fundamentals of aerospace engineering)

Course objectives:

The main aim of the course is to provide basic knowledge on the initial design process for new aircraft. This includes fundamentals of layout techniques and analytical methods required for the conceptual design phase. Another course objective is to show the multidisciplinary nature of an aircraft development on the example of civil transport airplanes.

After the course students should be able:

- to understand the aircraft development process as well as the effect of the various aircraft engineering disciplines on the design
- to analyse aircraft concepts regarding flight performance and economic efficiency and
- to apply relevant knowledge and skills acquired to solve a given conceptual design problem

Course content:

The course includes following topics:

- Types of aircraft
- Aircraft development phases
- Regulatory requirements (FAR, CS)
- Basic design methodology
- Conceptual design of transport airplanes
 - Configuration
 - Weight estimation
 - Cabin and fuselage layout
 - Aerodynamic design: lift and drag
 - Performance
 - Control, stability, weight and balance
 - Propulsion
- Evaluation criteria

The course includes an optional design project.

Class schedule: 4 hours per week (2 h lectures, 2 h exercises)

Credits: 5 ECTS credit points / 5 LP

Offered: in fall/winter term (*Wintersemester*, October - February)

Prerequisites:

Basic courses in *aerodynamics* and *flight mechanics*

Course material:

The course material can be found at:

<https://tu-dresden.de/ing/maschinenwesen/ilr/ift/studium/wise/lfa>

Download instructions are provided in the course.

Further reading:

C. Rossow, K. Wolf, P. Horst

Handbuch der Luftfahrzeugtechnik, Hanser Verlag, 2014

E. Torenbeek

Advanced Aircraft Design: Conceptual Design, Technology and Optimization of Subsonic Civil Airplanes, John Wiley & Sons, 2013

D.P. Raymer

Aircraft Design: A Conceptual Approach, 5th Edition, AIAA Educational Series, Reston, USA, 2012

M.H. Sadraey

Aircraft Design: A Systems Engineering Approach, John Wiley & Sons Ltd., Chichester, UK, 2012

L.M. Nicolai, G.E. Carichner

Fundamentals of Aircraft and Airship Design: Volume I – Aircraft Design, AIAA Educational Series, Reston, USA, 2010

A.K. Kundu

Aircraft Design, Cambridge University Press, New York, USA, 2010

L.R. Jenkinson, P. Simpkin, D. Rhodes

Civil Jet Aircraft Design, Arnold, London, 1999

J. Roskam

Airplane Design (Part I – VIII), Design, Analysis and Research Corp., Lawrence, Kansas, USA, 1989-1997

E. Torenbeek

Synthesis of Subsonic Airplane Design, Delft University Press, 1982

L.K. Loftin

Subsonic Aircraft: Evolution and the Matching of Size to Performance, NASA, Reference Publication 1060, Washington, 1980

Assessment: Written examination (120 minutes)