



Einführung in die  
**Flugmechanik**

*(Introduction to Airplane Flight Mechanics)*

**Degree program:** Mechanical Engineering diploma degree / bachelor degree

**Program module:** MB-LRT-01 - Grundlagen des Fliegens (*Fundamentals of Flight*)

**Course objectives:**

The course provides an introduction to the mechanics of flight. The main emphasis is on flight performance, basic flight manoeuvres and the static stability of subsonic airplanes.

After the course students should be able

- to apply fundamentals of mechanics and mathematics for modelling the motion of airplanes,
- to understand the effect of aerodynamic and inertial forces as well as the characteristics of propulsion systems on the performance

and

- to apply analytical methods for estimating the performance of airplanes.

**Course content:**

The course includes following topics:

- Equations of motion of an aircraft
- Aerodynamic forces and moments
- Airplane propulsion
- Linearized equations of longitudinal motion
- Performance at take-off and landing (e.g. take-off and landing distance)
- Climb and descend performance (e.g. rate of climb, angle of climb)
- En route performance (e.g. range and endurance)
- Airplane manoeuvres (e.g. banked turn, pull-up and pull-down)
- Longitudinal static stability

**Class schedule:** 4 hours per week (2 h lecture, 2 h exercise)

**Credits:** 5 ECTS credit points / 5 LP

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

**Prerequisites:**

Basic courses in *mechanics* and *fluid dynamics*

**Course material:**

The course material is provided at:

<https://tu-dresden.de/ing/maschinenwesen/ilr/lft/studium/wise/lfm>

Download instructions are provided in the course.

**Further reading:**

Rossow, C.; Wolf, K.; Horst, P.

*Handbuch der Luftfahrzeugtechnik*, Hanser Verlag, 2014

Filippone, A.

*Advanced Aircraft Flight Performance*, Cambridge University Press, 2012

Brockhaus, R.; Alles, W.; Luckner, R.

*Flugregelung*, Springer-Verlag, 3. neu bearbeitete Auflage, 2011

Phillips, W. F.

*Mechanics of Flight*, John Wiley & Sons, 2nd Edition, 2009

Hull, D. G.

*Fundamentals of Airplane Flight Mechanics*, Springer Verlag, 2007

Filippone, A.

*Flight Performance of Fixed and Rotary Wing Aircraft*, Elsevier Ltd., Oxford, 2006

Stengel, R.F.

*Flight Dynamics*, Princeton University Press, 2006

**Assessment:** Written examination (120 minutes)