

# Flight Mechanics

Programme course

6 credits

Flygmekanik

TMME50

Valid from: 2017 Spring semester

**Determined by**  
Board of Studies for Mechanical  
Engineering and Design

**Date determined**  
2017-01-25

## Main field of study

Mechanical Engineering

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Aeronautical Engineering, Master's Programme
- Mechanical Engineering, M Sc in Engineering

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

Calculus in one and several variables including ordinary differential equations, vector algebra, matrix algebra, basic rigid body dynamics, basic automatic control.

## Intended learning outcomes

The purpose of the course is to provide the student with a basic ability to model and analyze the motion of an airplane, particularly with regard to stability characteristics. After the course the student should be able to:

- Implement models for the motion of an aeroplane in terms of nonlinear differential equations, linear differential equations or transfer functions on a computer.
- Explain differences in computed results in terms of differences in the models used.
- Use criteria for flying qualities formulated in terms of the eigenvalues of the linearized model.
- Describe the classical eigenmodes of an aeroplane.

## Course content

Modelling of aerodynamic forces using stability derivatives, rigid body dynamics in three dimensions, equations of motion for an aeroplane and the linearization of these, classical eigenmodes of aeroplane motion, dynamic stability, rate gyros, control systems.

## Teaching and working methods

The course is given as a series of lectures and computer sessions.

## Examination

UPG1            Exercise            6 credits            U, 3, 4, 5

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Other information

Supplementary courses: Courses in aircraft design and in mechatronics.

## Department

Institutionen för ekonomisk och industriell utveckling

## Director of Studies or equivalent

Peter Schmidt

## Examiner

Lars Johansson

## Course website and other links

## Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 108 h

## Course literature

### Additional literature

#### Books

Nelson, R. C, (1998) *Flight Stability and Automatic Control*, McGraw-Hill 2 ed

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).