

# Fundamentals of Astrodynamics

## Master Seminar

Summer Semester 2020

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Amin Mohebbi

*Web:* [mathi.uni-heidelberg.de/~amohebbi](http://mathi.uni-heidelberg.de/~amohebbi)

*E-mail:* [amohebbi@mathi.uni-heidelberg.de](mailto:amohebbi@mathi.uni-heidelberg.de)

## Modulbeschreibung

**Name:** Fundamentals of Astrodynamics

**Kürzel:** MM33

**Leistungspunkte:** 4

**Sprache:** Englisch

**Lehrform:** Seminar 2SWS .

**Inhalt:** In this course, we are going to study the fundamental concepts of astrodynamics. These concepts are required for engineers and scientists who are interested in aerospace sciences. Study of astrodynamics helps us in understanding the mechanics of flight for satellites such as determining their trajectories and estimating their energies.

To these goals, we will study the following topics. First, we introduce the 2-body equation and then develop it to the n-body equation of motion. We analyze the latter equation by determining a preliminary orbit and optimizing it by using the differential correction method. Then we will discuss the Hohmann transfer, give a formula for time of flight, first, as a function of eccentric anomaly and then, in the universal case. We continue the course with a closer look at the Kepler problem and Gauss problem and give some applications of them. Finally, we will examine integration schemes and errors and then analytic formulations of several common perturbations.

**Prüfung:** 30-minute oral exam at the end of the course.

**Zeit:** Jede Woche Donnerstag um 11 Uhr

**Nützliche Literatur:**

Fundamentals of Astrodynamics; R. BATE, D. MUELLER, J. WHITE

The Geometry of Celestial Mechanics; H. GEIGES.