SD2900 Fundamentals of Space-flight 7.5 credits

Rymdteknikens grunder

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for SD2900 valid from Autumn 2013

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

The course is primarily intended for students in the Aerospace Engineering Master's programme (including exchange students). For as long as room is available, other students are also welcome to participate.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The **overall** learning objectives of the course are that you should:

- on the approved level, be able to **apply** fundamental principles in order to **explain** the governing dynamics of spaceflight, with emphasis on rocket dynamics and basic orbital mechanics,
- on the honors level, be able to **derive**, **relate** and **develop** mathematical models of spaceflight, with emphasis on launcher trajectories, two-body orbital mechanics, relative orbital motion and low-thrust orbit transfer,
- in a collaborative setting, be able to **plan** a geocentric space mission on a conceptual level, including elements such as determination of suitable trajectories, the number of stages required, and the approximate energy and mass budget,
- in a collaborative setting, be able to **write** an engineering paper, to **prepare** and **perform** an oral presentation, and to **deliver** and **receive** constructive feedback on such work, and
- improve your ability to work and learn in a culturally mixed group, and to **identify** your own strengths and areas of personal development in the interaction with others.

Course contents

In order to create a natural and creative learning environment, a peer learning approach is used in the course. You will therefore belong to a student team that meets on a regular basis to discuss essential topics in the course and to perform project work. You will treat topics like rocket propulsion and performance, launcher dynamics, basic orbital mechanics, relative orbital motion and orbital maneuvers. The technical work in the course mainly consists of a project assignment, typically related to a topic of current interest in the space industry. This means that the focus of the course can differ somewhat from one year to the next.

Course literature

William E. Wiesel, Spaceflight Dynamics, 3rd ed., Aphelion Press, 2010.

The book can be purchased in the student expedition at KTH Aeronautical and Vehicle Engineering, Teknikringen 8.

Examination

- KON1 - Conceptual Test, 3.5 credits, grading scale: P, F
- PRO1 - Project Assignment, 4.0 credits, grading scale: P, F
- TEN1 - Optional Oral Dissertation, - credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Approved oral and written presentation of project work (PRO1; 4.0 credits) and approved written test or equivalent oral accomplishment (KON1; 3.5 credits).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.