



# SD2905 Human Spaceflight 7.5 credits

Bemannad rymdfart

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

## Establishment

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Mechanical Engineering

## Specific prerequisites

Knowledge that corresponds to Bachelor's degree in technology and the course SD2816 Rocket Science or SD2900 Fundamentals of Spaceflight. The course is mainly intended for students who read the Master's programme Aerospace Engineering. In case of a vacancy also other students are welcome.

## Language of instruction

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

## Intended learning outcomes

The general aim of the course is to give the course participants a good understanding of most aspects of manned space transportation with ability to analyse questions related to vessels and the role of humans in space.

In more detail, on completion of the course the participants should be able to:

- Account for the manned space vehicles that have been used and analyse specifically which problem they have had.
- Account for design demands that are set on manned space vehicles and explain the reasons for them. Analyse different technical solutions that have been used or been suggested. This both regarding launchers, life-sustaining systems on the space station and space suits.
- Account for the medical effects of space travels and the methods for reduction of these that are used.
- Analyse the general research fields that draw use of experiment in zero gravity and give some specific example of experiments.
- Analyse the role of astronauts.
- Discuss the economical and political factors that influence manned space transportation.

The course also has an aim to give training in:

- learning a new subject in co-operation with others,
- presenting results and conclusions in an efficient way, and
- review and give constructive feedback on the work of others.

## Course contents

The course will mainly treat the following subjects:

- Historical overview of manned space transportation
- The space environment
- Space vehicles for people and requirements on these: launchers, the space shuttle, space stations
- Medical aspects of space transportation
- Life-sustaining systems on space vehicles
- How the international space station ISS was built, and is handled
- Research at ISS and in zero gravity
- Astronaut selection and training
- Political, economical and community perspective of manned space transportation

An important part of the course is a project work that is carried out in groups of 4-6 students. The groups can choose assignments or problems that deepen different aspects of the course content: the history account, technical solutions, medical problems, research examples,

future scenarios, and so further. The project work is presented at the end of the course at a conference day.

## Course literature

Carol Norberg (2012), Human Spaceflight and Exploration. Berlin: Springer Verlag.

Additional literature will be announced at the beginning of the course.

## Examination

- PRO1 - Project Assignment, 4.0 credits, grading scale: P, F
- TEN1 - Examination, 3.5 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.

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

## Other requirements for final grade

Passed oral and written presentation of project work (PRO1; 4 credits) and passed written examination (TEN1; 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.