

SYLLABUS

Spacecraft on board datahandling 7.5 credits R7018R

Omborddatorer för rymdfarkoster

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2023-02-15**

Spacecraft on board datahandling 7.5 credits R7018R

Omborrdatorer för rymdfarkoster

Second cycle, R7018R

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Rymdteknik	Space Technology

Main field of study

Space Technology

Entry requirements

Programming (e.g. D0017E Introduction to programming for engineers), microcomputers (e.g. D0001R Microcomputer engineering with space applications) and electronics (e.g. E0007E Electronics). The student shall have understanding of the space environment (e.g. R7004R Spacecraft Environment Interactions). The student should also have a background in technical report writing and presentation skills. Apart from the general requirements, knowledge in Spacecraft Subsystems or similar qualifications is of advantage as well as a basic knowledge equivalent to BSc level in data communications.

Knowledge in English equivalent to English 6.

Selection

The selection is based on 30-285 credits

Course Aim

The course aim is to give a deeper understanding for space vehicle data handling systems.

After completion of the course the student shall:

1. be able to describe common components of data handling systems for satellites and other space vehicles, and their relation, both functionally and implemented in hard- and software.
2. show an ability to design, analyze and critically evaluate different technical solutions for the data handling system for a given mission, and to present the designs and discussions in academic writing.
This is shown by a written report presenting a basic design of the data handling system for a given simplified satellite mission or analysis of chosen designs.
3. show an ability to follow and document a software process model, from requirements specification to implementation, and following a professional practice by performing work in accordance with generally accepted practices, standards, and guidelines.
This is shown in a group assignment, by applying the software process model on a given simplified software project from user requirements specification (where limited information is given at project start) to design and implementation, and including documentation according to standard, practice and guidelines.

Contents

Data handling system, hardware and software. On-board computers (CPU, memories, busses, interfaces), IO-units, telemetry and telecommand formats. Standards related to data-handling systems for space vehicles. SAVOIR. Basic programming of safety critical and real time systems. Basics in standards for software engineering, documentation, requirements engineering and specification, design analysis and specification, implementation on given hardware. Basics in UML. Software development environment. C-programming using a real-time operating system.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The course is a combination of lectures, guest lectures from space industry and assignments.

Written reports on assignments. For group projects one report per group shall be handed in, but all students shall contribute to the report and all parts shall be reviewed by the group members.

The assignments including implementation on a given hardware will give an opportunity for the student to test methods for real time system software development taught during lectures, to analyze and compare system and software designs and make the student familiar with common software tools. These assignments includes a compulsory attendance part for demonstration of the implementation on hardware.

Apart from scheduled teaching the students are expected to study parts of the course literature individually and solve exercises belonging to course sections.

The student shall also study scientific and technical papers and, based on these and other relevant sources, write a report following common standard for academic writing.

The students are also expected to study and interpret given standards on software engineering, and to apply the standards on a group software project, following a software process model and the standards for documentation, even with limited information.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

The course is assessed through an individual written exam and written reports on assignments.

Intended learning outcome 1 is assessed through written exam. Intended learning outcome 2-3 is assessed through the written exam and the assignments.

All exams included in the module need to be completed for a course grade. Some assignments render bonus marks on the written exam that follows directly after the course has been given and the following two re-exams.

Supplementation is permitted within 3 weeks after the examination by written home assignment. Completion is possible if all parts and assignments have been submitted and approved and the supplement only concerns a partial question on the written exam.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course R7018R is equal to R7008R

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Assignment report	U G#	3	Mandatory	A21	
0004	Written exam	G U 3 4 5	4.5	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Robert Brännström 2023-02-15

Syllabus established

by Huvudansvarig utbildningsledare SRT, Jonny Johansson 2011-02-07