



# IE120V Electronics and Programming for Space Applications 7.5 credits

Elektronik och programmering för rymdtillämpningar

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

The official course syllabus is valid from the autumn semester 2022 in accordance with head of school decision: J-2021-1996. Decision date: 14/10/2021

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Technology

## Language of instruction

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

## Intended learning outcomes

After completed course, the student is expected to be able to

- carry out simple calculations and computer simulations on electric nets using Ohm's law and Kirchhoff's laws
- carry out simple calculations and computer simulations on filters, amplifiers, sensors and radio range
- connect and measure on electric nets to verify own calculations and simulations
- connect and program microcontroller, sensors, amplifier and radio
- explain the use of satellites in the service of the humanity for e.g. communication, weather and climate monitoring for own pupils
- explain the technical function of a satellite by means of block model and practical demonstrations for own pupils
- plan, carry out and evaluate teaching for an optional student group with contents and abilities retrieved from the subject content of the course and related to didactic literature and current course syllabi and subject plans.

## Course contents

The course is intended for teachers in the basis and upper-secondary school that has become inspired of e.g. ESERO Cansat and now want to learn more about electronics and embedded systems or that want to increase his skills for teaching of mathematics, technology, physics and programming. The course is based on elements from courses on KTH Royal Institute of Technology, but with a selection that covers all parts of the technology for e.g. Cansat or a satellite. Apart from basic electromagnetism and electronics, introduction to the function of the microcontroller (e.g. an Arduino, hardware and software) is included, different sensors that can be used, power supply from battery or solar panels and radio communications including antennas. Also the challenges of the space environment for a practical satellite are described, including cosmic radiation, low and high temperatures, electricity supply with solar panels, principles of radio communications, satellite orbits and launch. The course activities interleave theoretical, practical (laboratory) and didactic items.

## Specific prerequisites

The upper secondary courses Mathematics D, Physics B and Chemistry A.

## Examination

- LAB1 - Lab exercises, 3.0 credits, grading scale: P, F
- PRO1 - Project, 1.5 credits, grading scale: P, F
- TEN1 - Oral exam, 3.0 credits, grading scale: A, B, C, D, E, FX, 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.

## **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.