

SYLLABUS

Radars for space and atmospheric research 7.5 credits F7013R

Radar för rymd- och atmosfärsforskning

Course syllabus admitted: Autumn 2017 Sp 1 - Present

**DECISION DATE
2017-02-15**

Radars for space and atmospheric research 7.5 credits F7013R

Radars för rymd- och atmosfärsforskning

Second cycle, F7013R

| Education level | Grade scale | Subject | Subject group (SCB) |
|-----------------|-------------|------------------------------|---------------------|
| Second cycle | G U 3 4 5 | Rymd- och atmosfärsvetenskap | Space Technology |

Main field of study

Space Technology

Entry requirements

Courses of at least 120 credits at first cycle including the following knowledge/courses. Basic knowledge in mathematics, electromagnetism, Matlab programming. Courses in mathematics (M0018M Linear Analysis, M0031M Linear Algebra and Differential Equations), physics (F0004T Physics 1, F0005T Physics 2, F0006T Physics 3).

Selection

The selection is based on 30-285 credits

Examiner

Victoria Barabash

Course Aim

The student shall acquire knowledge about technical aspects of radar and optical systems as well as their scientific applications for geospheric research. This is shown by capability to describe and explain physical and technical principles of the radar and optical systems as well as capability to use these systems in order to plan and perform scientific experiments in space.

The student shall show capability to critically and independently formulate the problems as well as perform technical calculations for radar and optical systems within the given time frame. This is done via problem solving. The student shall be able to motivate, plan and perform scientific experiments with these systems during the practical work. The student shall be able to critically select and evaluate relevant scientific and technical information within the subject via the literature survey. Ability and skills to present own results and arguments during international events are evaluated via report writing in English. The student shall demonstrate social skills and be able to effectively work in a group during the practical work.

The student shall have insight about technical possibilities and limits as well as human responsibility for the way of their using. This is shown via evaluation of the relevant technological and ethic aspects.

Contents

Introduction to the radar systems. Radar equation. Radar targets. Information from the radar signals. Fundamentals of coherent and incoherent radar systems. Configuration of the radar system and optimisation. Radar hardware incl. antennas, transmitter, receiver.

Signal processing and data analysis.

Radar systems applications for space and atmospheric research.

In order to run the radar experiment specific software for EISCAT radar system is used. To work with the radar data processing a program MATLAB is used.

Realization

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

Lectures, project work and assignments that consider theoretical aspects, training in experimental techniques and technical report writing in English.

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. Written examination, assignments and project. In order to pass the course it is required that examination and obligatory tasks are completely satisfactory. The final grade reflects the results obtained during compulsory moments of the course. The grading system for the course is: excellent (5), very good (4), satisfactory (3).

Overlap

The course F7013R is equal to F7003R

Literature. Valid from Spring 2017 Sp 3

Mark A. Richards, James A. Scheer, William A. Holm, Principles of Modern Radar, Vol.1, Scitech Publishing Inc., 2010, ISBN 978-1-891121-52-4

Course offered by

Department of Computer Science, Electrical and Space Engineering

Items/credits

No items/credits available

Last revised

by Jonny Johansson, HUL SRT 2017-02-15

Syllabus established

by Jonny Johansson, HUL SRT 2016-06-15