Digital communications 7.5 credits S7012E

Digital kommunikation

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2022-02-11

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Digital communications 7.5 credits S7012E

Digital kommunikation

Second cycle, S7012E

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

Entry requirements

Mathematics (corresponding to M0031M Linear Algera and Differential Equations or M0049M Linear Algebra and Differential Equations), linear analysis (corresponding to M0018M Linear Analysis), introductory signal processing (corresponding to S0001E Signal Analysis).

Good knowledge in English equivalent to English 6.

Selection

The selection is based on 30-285 credits

Course Aim

The student shall be able to:

- Describe, explain, linear modulation
- Describe, explain, calculate communications signals' spectrum and bandwidth
- Describe, explain, calculate baseband representation of signals with passband nature
- Describe, explain, calculate signal constellations, their energy, and distance properties
- Describe, explain, calculate Nyquist-pulses for communication and their properties
- Describe, explain, calculate how signals can be represented sas vectors
- Describe, explain, calculate the matched filter
- Describe, explain, calculate additive Gaussian noise and its power
- Describe, explain, calculate hypothesis tests and detection
- Describe, explain, calculate MAP- och ML-detector
- Describe, explain, calculate Q-function
- Describe, explain, calculate detectors' error probabilities
- Describe, explain OFDM
- Evaluate and simulate simple digital communications systems in MATLAB.

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Contents

Beyond an introduction on information och channel capacity, the course treats theory and applications of a number of basic concepts in digital communications, such as:

- vector representations
- digital modulation (PSK, QAM)
- pulse forms
- noise
- the matched filter
- Nyquist signalling
- intersymbol interference
- detection
- optimal receivers
- maximum likelihood detection
- performance measures
- dispersive channels
- error probability
- OFDM

Mandatory computer exercises in Matlab are part of the course

Realization

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

Lectures, exercise sessions, and laboratory work (computer assignments).

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.

Mandatory laboratory assignments with written reports and written exam with differentiated grades.

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.

Remarks

The course can be offered in English

Course offered by

Department of Computer Science, Electrical and Space Engineering

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Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	1.5	Mandatory	A15	
0003	Written exam	G U 3 4 5	6	Mandatory	S22	

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 Jonny Johansson, HUL SRT 2022-02-11

Syllabus established

by Jonny Johansson, HUL SRT 2015-02-16

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