



# SK2906 Quantum Circuits 7.5 credits

## Kvantkretsar

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

Course syllabus for SK2906 valid from Autumn 2020

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Engineering Physics

## Specific prerequisites

Completed course SI1146 Vector analysis and SI1155 Theoretical physics.

## Language of instruction

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

## Intended learning outcomes

After finished course the student should be able to:

- apply basic theories of quantum transport
- formulate and analyze lumped-element model for quantum circuits
- explain basic concepts of quantum-limited measurement

## Course contents

Basic quantum transport theory: Landauer's formula and Landauer-Büttiker's formalism, coulomb-blocked and single-electron circuits. Basic superconducting electronics: The Josephson effect and classical non-linear dynamics of superconducting circuits. Quantum electrodynamics of superconducting circuits and superconducting quantum bits. Hybrid quantum systems such as quantum optomechanics and quantum acoustics.

## Examination

- INL1 - Homework Problems, 7.5 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.