



# SI150V Introductory Relativity Theory 4.5 credits

## Inledande relativitetsteori

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

The course plan applies from and including HT2023 according to school head decision: S-2022-2256 Decision date: 2022-12-29

## Grading scale

P, F

## Education cycle

First cycle

## Main field of study

Physics, Technology

## Specific prerequisites

Mathematics D/Mathematics C, Physics B/Physics 2 with the lowest grade passed.

## Language of instruction

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

# Intended learning outcomes

After completing the course you should be familiar with basic concepts in both the theory of relativity and the mechanics prior to Einstein, for example, invariance and symmetry, observers and reference frames. You should have gained insight into the contradictions between the Newtonian mechanics and Maxwell's equations that led to the revolution of relativity. You should be able to transform time and space between observer that move relative to each other and realize how these transformations lead to length contraction and time dilation. Realize the connection between mass and energy to have insight in how relativistic phenomena are exploited in technological applications.

## Course contents

Translations and simple rotations, the notion of invariance in physics, the definition of space and time in Newtonian mechanics, Galileiinvarians, addition of velocities in Newtonian mechanics, the concepts of inertial and rest frames of reference, Lorentz time transformation, the nature of light and speed, the Michelson-Morley experiment and Lorentzcontraktionen, simultaneity, length contraction, the twin paradox, relativistic kinematics and relativistic reactions.

## Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- INL2 - Assignment, 1.5 credits, grading scale: P, F
- INL3 - Assignment, 1.5 credits, grading scale: P, 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.

If the course is discontinued, students may request to be examined during the following two academic years.

## Other requirements for final grade

Three completed sets of problems.

## 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.