



# SF2972 Game Theory 7.5 credits

## Spelteori

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 SF2972 valid from Spring 2020

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Mathematics

## Specific prerequisites

- Completed basic course in calculus in one variable (SF1625, SF1673 or equivalent)
- Completed basic course in calculus in several variables (SF1626, SF1674 or equivalent)

## Language of instruction

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

## Intended learning outcomes

The aim of the course is to give a basic understanding of game theory, and how it can be applied in different problem areas. The course deals with both classical game theory and combinatorial game theory.

After completing the course, the student shall be able to:

- use the appropriate method to analyze and find solutions for different two-person games,
- analyze multi-person games for the existence of stable solutions,
- describe combinatorial games and methods for playing them in an optimal way, and
- independently solve slightly more complex problems and present the results both orally and in writing.

## Course contents

Games in normal form:

- Pure and mixed strategies
- Nash equilibrium
- Dominance and rationalizability
- Imperfect information and Bayesian games

Games in extensive form:

- Pure, mixed, and behavioral strategies, Kuhn's theorem
- Perfect information: Nash equilibrium, subgame perfect equilibrium
- Imperfect information: sequential and perfect Bayesian equilibrium

Combinatorial game theory:

- impartial games: nim, nimber, Sprague-Grundy's theorem
- partizan games: Hackenbush, Conway's abstract theory, surreal numbers
- computational game theory: minimax method, alpha-beta pruning

## Examination

- INL1 - Hand in Exercise, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 6.0 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.