



# SF2972 Game Theory 7.5 credits

## Spelteori

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

## Establishment

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Mathematics

## Specific prerequisites

150 university credits (hp) whereas 45 university credits (hp) in mathematics. Including previous knowledge in basic Discrete Mathematics (e.g. from the course SF1610 or equivalent) and in Calculus in One and Several Variables (e.g. from the courses SF1625 and SF1626) and documented proficiency in English corresponding to English B.

## Language of instruction

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

## Intended learning outcomes

After passing the course the student should be familiar with basic concepts, models and theorems in both classical and combinatorial game theory.

## 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

## Course literature

Martin J. Osborne and Ariel Rubinstein, A course in game theory, MIT Press. Finns för gratis (men ändå laglig) nedladdning på <http://theory.economics.utoronto.ca/books/>.

J. H. Conway, On Numbers and Games, A.K. Peters, Ltd., 2001, 2nd ed., (1st Ed., Academic Press, New York, 1976).

E. R. Berlekamp, J. H. Conway, R. K. Guy, Winning Ways for Your Mathematical Plays, A.K. Peters, Ltd., 2001, 2nd ed., Vol. 1-4, (1st ed., Academic Press, New York, 1982). En elektronisk version finns på KTHB, gratis för KTH-studenter.

## 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.

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

INL1 - Hand-in exercises, 1,5 credits, grade scale: P, F

TEN1 - Examination, 6 credits, grade scale: A, B, C, D, E, FX, F

## Other requirements for final grade

Assignment (INL1; 1,5 university credits), written exam (TEN1; 6 university credits)

## 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.