SF2741 Enumerative Combinatorics 7.5 credits

Enumerativ kombinatorik

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 SF2741 valid from Autumn 2011

Grading scale

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

Education cycle

Second cycle

Main field of study

Mathematics

Specific prerequisites

SF1631, or similar courses. A certain amount of mathematical maturity.

Language of instruction

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

Intended learning outcomes

After completing this course the student is expected to be acquainted with the basic theory in enumerative combinatorics, and the methods used therein.
Specifically the student should

- know miscellaneous standard concepts and sequences in combinatorics, and their properties,
- be able to reformulate and by this solve problems in terms of the concepts alluded to above,
- be able to manipulate and derive properties of formal power series,
- be able to derive recursions, generating functions and provide explicit formulas for various combinatorial sequences,
- be able to construct combinatorial proofs of identities and inequalities,
- be able to use Möbius inversion, inclusion-exclusion and related sieve methods to solve enumerative problems,
- be able to define and derive properties of various classes of posets,
- be able to describe and make computations in the incidence algebra of a poset,
- be able to compute the Möbius function of a poset by various methods and interpret such problems in topological terms.

Course contents

Basic methods in enumerative combinatorics. Sieve methods, for example inclusion-exclusion, the involution principle and the method of using determinants to count lattice paths. Various aspects of the theory of partially ordered sets, for example lattice theory, Möbius inversion in posets, P-partitions, and connections to topology.

Course literature

Richard P. Stanley, Enumerative Combinatorics, volume 1, second edition, Cambridge University Press, 2011.

Examination

- TEN1 - Examination, 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.

Other requirements for final grade

Homework problems and possibly a written report on a research paper.

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.