



# FSF3970 Bayesian Network 7.5 credits

## Bayesianska nätverk

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 FSF3970 valid from Autumn 2009

## Grading scale

## Education cycle

Third cycle

## Specific prerequisites

Masters degree in mathematics, or in computational mathematics or in computer science/engineering with at least 30 cu in mathematics and 20 cu in statistics.

Suitable course: SF2740 Graph theory 7,5 hp

## Language of instruction

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

# Intended learning outcomes

By the end of the course, the participants

- Will be able to assess when to use a Bayesian network as a model for an interaction of several variables.
- will be able to identify statements of conditional independence by a DAG.
- will be able to use at least two algorithms to learn the structure of a Bayesian network from data
- will be able to use available software for update of probabilities
- will be able to assess the nature of statements of causality in a statistical model.

## Course contents

- Causality and directed acyclic graphs, and d-separation, conditional independence
- Markov properties for directed acyclic graphs and faithfulness.
- Learning about probabilities
- Structural learning; MDL, predictive inference
- Exponential families and graphical models (Conditional Gaussian distributions)
- Causality and intervention calculus
- Chordal and decomposable graphs, moral graphs, junction trees, triangulation
- Local computation on the junction tree, marginalization operations propagation of probability and evidence, consistency
- Factor graphs, The Sum -Product algorithm (Wiberg's algorithm)

## Disposition

Lectures and seminars

## Course literature

T. Koski & J. Noble: Bayesian Networks: An Introduction (2009) J. Wiley & Sons.

## Examination

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.

Computer project and homework assignments.

## Other requirements for final grade

The examination is computer project P/F and homework assignments (80 % correct).

## 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.