

# Graphical models

2 hours of lectures per week.

## Lecturer

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## Content

The course will give an introduction to graphical models based on directed acyclic graphs and their applications. Subjects covered include: Markov properties on directed graphs, Bayesian networks, local exact computation, graphical models for genetic analyses, the EM algorithm for Bayesian networks, Bayesian graphical models.

The course will be based on a combination of material from Lauritzen (1996), Cowell et al. (1999), lecture notes, selected journal articles, as well as graphical model software.

## Prerequisites

*Basic understanding of probability and statistics is needed. It is an advantage to be familiar with elements of undirected graphical models, for example at the level of Lauritzen (1989).*

## Literature

S. L. Lauritzen. *Lectures on Contingency Tables*. 3rd ed.

Department of Mathematics, Aalborg University. 1989.

Electronic version 2002: [www.math.auc.dk/~steffen/cont.pdf](http://www.math.auc.dk/~steffen/cont.pdf).

S. L. Lauritzen. *Graphical Models*. Clarendon Press, Oxford, 1996.

R. G. Cowell, A. P. Dawid, S. L. Lauritzen and D. J. Spiegelhalter.

*Probabilistic Networks and Expert Systems*. Springer, New York, 1999.

## Software

HUGIN Lite ([www.hugin.com](http://www.hugin.com)).

WinBUGS ([www.mrc-bsu.cam.ac.uk/bugs/](http://www.mrc-bsu.cam.ac.uk/bugs/)).

## Home page

Further information, course material other than listed above etc., will be made available through [www.math.auc.dk/~steffen/gm03/](http://www.math.auc.dk/~steffen/gm03/)