

# Course Outline : Intelligent Data Analysis and Probabilistic Inference.

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**Course Website:** <http://www.doc.ic.ac.uk/dfg/ProbabilisticInference/Bayesian.html>

## Lectures

The first twelve lectures are on probabilistic inference using Bayesian Networks. Lectures 13-16 cover topics in data modelling. Lectures 17 and 18 cover selected topics in classification

## Tutorials

The tutorials are problem sheets intended to help you understand the material of the lectures, and get useful practice for the exams. One or two of the tutorials are considerably harder than anything that will appear in an exam, so don't despair if you occasionally find them hard. There will be three tutors to help you at the tutorial sessions

## Coursework

The coursework is a practical exercise using python to model and manipulate data sets. It is divided into four parts, the first of which you can begin after lecture 2. You are advised to work in groups of 2 or 3 (full details in the handout).

## Booklist

The material for this course has been drawn from a wide range of sources and unfortunately there is no single book that can be recommended. The following books are available in the IC library and may prove useful in supporting the course.

1. Christopher Bishop: Pattern Recognition and Machine Learning. Springer Verlag 2006. This is a very well written and comprehensive book. The approach is a little different from the course, and it covers a lot more material, but it is still an excellent source of information.
2. Judea Pearl: Probabilistic Reasoning in Intelligent Systems. Morgan Kaufmann 1988 This book is regarded by many as the seminal work on Bayesian Networks. It is however not an easy read as Pearl has a habit of making the notation over complicated.
3. Richard Neapolitan: Probabilistic Reasoning in Expert Systems. John Wiley 1990 This is an excellent book, but unfortunately it is out of print. There are copies in the IC libraries. It covers much of the material of lectures 1 to 5 and 10 to 11.
4. Richard Neapolitan: Learning Bayesian Networks, Pearson 2003 This book concentrates more on learning networks than inference. It contains material relevant to lectures 6 to 8 and 12.
5. Finn Jensen: Introduction to Bayesian Networks. This is a clearly written book. The approach is different to the one we take in lectures 1 to 12, and is more focused on join trees but you may still find it helpful.
6. David Hand (editor): Intelligent Data Analysis. This is a collection of papers supporting the last six lectures (though not completely). It also covers many other topics that are relevant in modern Data Analysis, but are not in this particular course