

# 02457 NON-LINEAR SIGNAL PROCESSING

## Plan and reading for lectures: August-November 2006

### INTRODUCTION

- 04/09 Course introduction. **Reading:** Bishop Ch. 1.1-1.4,1.8-1.9
- 07/09 Math review
- 11/09 The probabilistic description of data and signals.  
**Reading:** Bishop Ch. 1.8-1.10, 2.1
- 14/09 Exercise 1

### THE LEARNING PROBLEM

- 18/09 The likelihood function, linear models, principal components.  
**Reading:** Bishop Ch. 2.2-2.5,3.4,8.6.1,3.1-3.6 Appendix A,E
- 21/09 Exercise 2
- 25/09 Generalization. Measuring test errors asymptotics and penalties.  
**Reading:** Bishop Ch. 9.1-9.2,,9.5,9.8.
- 28/09 Exercise 3

### NON-LINEAR MODELS

- 02/10 Perceptrons, backpropagation. **Reading:** Bishop Ch. 4.1-4.4,4.8,7.1,7.5.
- 05/10 Exercise 4
- 09/10 Improved training methods.  
**Reading:** Bishop Ch. 4.9-4.10,7.2,7.6-7.7,7.9.
- 12/10 Exercise 5
- 23/10 Signal detection with perceptrons. **Reading:** Bishop Ch. 6.7-6.11
- 26/10 Exercise 6
- 30/10 The EM algorithm. K-means. **Reading:** Bishop Ch. 2.6,5.2,5.7,5.9.3
- 02/11 Exercise 7
- 06/11 Radial Basis Functions. **Reading:** Bishop Ch. 5.3,5.7-5.10.
- 09/11 Exercise 8
- 13/11 Hidden markov models. **Reading:** To be announced
- 16/11 Exercise 9
- 20/11 Hidden markov models **Reading:** TBA.
- 23/11 Miniproject HMM
- 27/11 Hidden markov models **Reading:** TBA.
- 30/11 Miniproject HMM
- 04/12 Review lecture
- 07/12 Miniproject HMM

Lars Kai Hansen, IMM, August 2006.