

## CMPS 242 Syllabus, Fall '06

Here is a tentative syllabus for the Machine Learning class. Additional topics may be inserted and/or some topics may be skipped based on the interests of the class. The syllabus is aggressive, and it is unlikely that we will get to everything on this list. The text is *Introduction to Machine Learning* by Alpaydin. You might find an introduction to probability as well as these other books useful:

- *The Elements of Statistical Learning* by Hastie, Tibshirani, Friedman
- *Neural Networks for Pattern Recognition* by Bishop
- *Pattern Classification* by Duda, Hart and Stork or the earlier *Pattern Classification and Scene Analysis* by Duda and Hart
- *Machine Learning* by Mitchell
- *Artificial Intelligence A Modern Approach* by Russell and Norvig.

I am assuming that students have some background in both analysis of algorithms and probability.

Planned Topics:

1. Introduction (ch 1 and 2)
2. Bayesian learning and parameter estimation (ch 3, 4, 5)
3. Batch learning: Decision Trees (ch 9) and Artificial Neural Networks (ch 11)
4. Linear Discrimination (ch 10) and the Perceptron algorithm (ch 11)
5. Support vector machines (ch 10.9)
6. Instance based learning (nearest neighbor) (ch 8)
7. Boosting (AdaBoost) (ch 15)
8. Clustering, EM Algorithm and K-means (ch 7)
9. On-line prediction (Blum survey)
10. Feature selection (ch 6)
11. Concept learning and PAC model and generalization bounds
12. Evaluating Hypotheses and model selection (ch 14)

Evaluation in the course will be based on periodic homework assignments (25%), an in-class midterm in the seventh or eighth week (35%) and a term project (40%). Students are encouraged to do the homework and project in groups of 2-3 students.