

*Syllabus* : **Introduction**: Basic concepts; **Supervised learning**: Supervised learning setup, LMS, Logistic regression, Perceptron, Exponential family, Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines, Model selection and feature selection, Ensemble methods: Bagging, boosting, Evaluating and debugging learning algorithms; **Learning theory**: Bias/variance tradeoff, Union and Chernoff/Hoeffding bounds, VC dimension, Worst case (online) learning; **Unsupervised learning**: Clustering K-means, EM. Mixture of Gaussians, Factor analysis, PCA (Principal components analysis), ICA (Independent components analysis); **Reinforcement learning and control**: MDPs. Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR), LQG, Q-learning. Value function approximation, Policy search. Reinforce. POMDPs.

*Texts* :

1. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, PHI, 2010
2. P. Langley, Elements of Machine Learning, Morgan Kaufmann, 1995.