**MACHINE LEARNING**

GOALS  
The objective of this assignature is to present the main techniques that are part of this field. At the end of it, students will be able to design a learning system to solve problems that involve prediction, analysis, classification, and structure learning.

CONTENTS

1. Introduction: What is machine learning? Examples of applications. Learning systems design. Approaches. Task learning. Concepts learning.
2. Bayesian Learning: Bayes theorem and learning concepts. Classification. Loss function. Discriminant function. Association rules. Optimal Bayesian classifier. EM algorithm.
3. Statistical Learning: Estimation by maximum likelihood. Evaluation of an estimator: bias and variance. Parametric classification. Model selection procedures. Multivariate methods. Principal component analysis.
4. Supervised and Unsupervised Learning: Single and multi-class learning. Clustering methods based on Euclidean distance and probabilities. Choice of the number of clusters. Hierarchical clustering. Support vector machines. Nuclei. Algorithms.
5. Decision Tree Learning: Representation of decision trees. Problems that are solved with this method. Algorithms. Extraction of rules from trees. Rule learning through data.
6. Instance-Based Learning: Learning k nearest neighbors. Locally weighted regression. Radial basis functions. Case-Based Reasoning.