

## COMP 4360: Machine Learning

**Course Description:** Learning strategies; evaluation of learning; learning in symbolic systems; neural networks, genetic algorithms. May not be held with ECE 4450.

**Prerequisite:** [COMP 3190 and (one of STAT 1150 (B), STAT 2220 (B), or PHYS 2496 (B)) and (one of MATH 1220, MATH 1300 (B), MATH 1301 (B), MATH 1310 (B), MATH 1210 (B), or MATH 1211 (B)) and (one of MATH 1230, MATH 1500 (B), MATH 1501 (B), MATH 1510 (B), the former MATH 1520 (B), or MATH 1524 (B))] or [STAT 2400 and MATH 2740 and DATA 2010].

### Outline

- 1) Concept Learning (4 weeks)  
Version spaces, inductive bias, learning of disjunctions, case-based meta learning.
- 2) Decision trees (3 weeks)  
ID3 and C4.5, the overfitting problem.
- 3) Neural nets (3 weeks)  
Perceptrons, gradient descent, backpropagation.
- 4) Instance-based learning (1 week)  
K-nearest neighbor algorithm, locally weighted regression, case-based reasoning.
- 5) Bayesian Learning (1 week)  
Bayes theorem, statistical independence, naive Bayesian learning.
- 6) Genetic algorithms (1/2 week)  
Classification using genetic algorithms, genetic programming.
- 7) Reinforcement learning (1/2 week)  
Dynamic programming, temporal difference learning, Q-learning.

**Text:** Tom. M. Mitchell, *Machine Learning*, 1st Edition, McGraw Hill