MEMORIAL UNIVERSITY OF NEWFOUNDLAND
Department of Computer Science

Computer Science 3200 – Winter 2018
Algorithmic Techniques for Smart Systems

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Course Website: https://www.cs.mun.ca/~dchurchill/courses/3200
(most course activity will take place on D2L)

Course Objectives:

This course is an introduction to Artificial Intelligence, covering algorithmic techniques and data structures used in modern problem-solving environments. Each topic will have a related assignment where the learned techniques are applied to simple video games.

Course Outline:

- Introduction to Artificial Intelligence
  - Agents, Environments, and Problems (Modern Examples)
- Search Algorithms
  - Exhaustive Search (BFS / DFS)
  - Heuristic Functions / Incorporating Knowledge
  - Heuristic Search (Best-First Search / A*)
  - Hill-Climbing Algorithms
  - Adversarial Search (Minimax / Alpha-Beta)
  - State Hashing / Lookup Tables
  - Data Structures / Optimizations for Search
  - Balancing Speed vs. Optimality
- Reinforcement Learning
  - Introduction to RL: Agent, Environment, Actions, Policies, Rewards
  - Bandit Problems (Exploration vs. Exploitation)
  - Action-Value Methods
  - Markov Decision Processes
  - Value Functions / Policy Improvement
  - Monte-Carlo Methods
  - Dynamic Programming
  - Temporal Difference Learning (SARSA / Q-Learning)

Textbook: Reinforcement Learning: An Introduction
http://incompleteideas.net/book/the-book.html

Format: 3 in-class lectures per week

Evaluation:

The final grade in the course will be determined as follows:

Tests (2 in-class tests)	20%
Assignments (5 submitted via D2L)	50%
Final Project + Report	30%