

## COMP 3190 – Introduction to Artificial Intelligence

**Calendar Description:** Principles of artificial intelligence; problem solving, knowledge representation and manipulation; the application of these principles to the solution of ‘hard’ problems.

**Prerequisite:** COMP 2140.

**This course is a prerequisite for:** COMP 4190, COMP 4200 and COMP 4360.

### Outline

- 1) Problem Solving (1 ¼ week)  
Problem solving; declarative problem representation, searching problem spaces; state-space search; problem-reduction search
- 2) Search (2 weeks)  
Basic search strategies: breadth-first search; depth-first search, heuristic search: hill climbing; beam search; best first
- 3) Knowledge Representation (3 ⅔ weeks)  
Basic representation: first-order logic, representation in clause form; reasoning with resolution and resolution refutation, representation and reasoning in Prolog (will be spread throughout the course), rule-based representations, structured representations: semantic nets; frames
- 4) Reasoning with Uncertainty (1 week)  
Reasoning with incomplete information; reasoning with imprecise information
- 5) Expert Systems (2/3 week)  
Organization of expert systems; knowledge engineering, surface reasoning; deep reasoning
- 6) Natural Language Understanding (1 ⅔ weeks)  
Strategies for NLU; syntax analysis; semantics analysis
- 7) Neural Networks (1 week)  
Organization of neural networks, one-layer feedforward networks; backpropagation networks
- 8) Planning (1 week)  
Representation of planning problems; state-based representations, solution of planning problems; frame problem
- 9) Distributed Artificial Intelligence (1 week)  
Problem decomposition and distribution to problem-solving agents, communication among agents

**Text:** G. Luger, *Artificial Intelligence*, Addison-Wesley (5<sup>th</sup> Edition)