**CMSC 671 Introduction to Artificial Intelligence, Fall 2010**
**Notes for the Midterm Exam**
**Prepared by Prof. Laura Zavala**

The midterm exam will be held in class on Thursday October 21$^{st}$.

The exam will be based on the concepts, techniques and algorithms discussed in the text book, in the extra reading assignments, and in class. It will cover up until October 12$^{th}$ class (Knowledge Representation).

I have provided some links to old mid-term exams on the class website. You can look at the tests to try your knowledge. The T/F and exercises might be similar in our test. Ignore the topics that we did not cover (not on the schedule). That includes any Lisp and Prolog questions.

There will be no questions that ask you to write or understand Lisp code.

It's important to have read the chapters in the textbook (1-9 and 12). This will fill in some of the gaps in our class coverage, as well as provide more background knowledge. You will need to know in detail only the sections listed in the schedule on the class website.

Only the Additional Readings from Sep. 23$^{rd}$ will be included on the test and only at a basic conceptual level. In fact the slides include the basic ideas. The others are there to give you more background knowledge, so you are welcome to read them too.

Here are things you should be prepared to do. The algorithms that we covered in more detailed are marked with special bullet. You should understand them and be able to simulate them (usually 1 or 2 steps):

**Chapter 1 and 2: Introduction** – This is a lot of introductory text. The main concepts you need to understand from here are the characteristics of environments and agents introduced in chapter 2 (the table on slides 35-41 with the examples of environments provides a good idea).

**Chapters 3 and 4: Search**
- Take a problem description and come up with a way to represent it as a search problem by developing a way to represent the states, actions, and recognize a goal state.
- Understand the concept of uninformed and informed search, as well as local search.

- Understand the concepts of completeness, time complexity, space complexity, and optimality/admissibility.
- Algorithms: Depth-First Search, Breadth-First Search, Best-First Search, A*.
- Algorithms covered conceptually (you should know the general idea): Iterative deepening, depth limited, bi-directional search, uniform cost search, Genetic Algorithms.

## Chapter 5: Constraint Satisfaction Problems

- Understand the basics of CSP, including variables, domains, constraints.
- Be able to take a problem description and set it up as a CSP problem.

- Algorithms: Backtracking, forward checking and ARC-3, min-constraints.

- Distributed Constraint Satisfaction

## Chapter 6: Adversarial search

- Understand the basic characteristics of games.
- Algorithms: Minimax with and without alpha-beta.
- Be able to take a game and develop a representation for it and its moves and to describe a static evaluation function.
- Understand how to handle games with uncertainty. Algorithms covered conceptually (you should know the general idea): Expectiminimax.

**Chapter 7 –** Not in the test.

## Chapters 8, 9, and 12

- Simple examples of First Order Logic, how to represent some facts and statements
- Some concepts: declarative approach, database semantics, entailment, derivation, and inference, completeness, decidability.
- First Order Logic Inference methods, you should know the general idea of how they work: Forward Chaining Algorithm, Backward chaining Algorithm, Generalized Modus Ponens (GMP), Resolution refutation.
- The basic concepts on Ontologies, Semantic Networks, and Description Logics.