CMSC671 **Artificial Intelligence** Fall 2014

Section 0101 TuTh 1:00 - 2:15PM IT 227

**Instructor:**


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**TA:**


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**Grader:**


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**Texts:**

Stuart Russell and Peter Norvig, *Artificial Intelligence - A Modern Approach*, Prentice Hall, Third Edition, 2009.

Supplementary materials (papers, book chapters and web pages) for selected topics.

**Course Description:**

This course is designed as a broad rather than in-depth introduction to the principles of artificial intelligence, its characteristics, major techniques, and important sub-fields and applications. Although some theoretical issues and mathematical derivations and proofs will be involved, the emphasis will be on understanding basic AI concepts and techniques, important ideas and issues. Students are expected to have basic knowledge of data structures, mathematical logic, and elementary probability theory. Knowledge of algorithm analysis and experience with Lisp programming are helpful.

The lectures will be divided into the following three parts (the order and timing of the lectures and exams are subject to change):

***Introduction*** (Chapters 1 & 2): **Lectures 1 – 3**

- History, motivations and characteristics of AI
- Brief intro of Lisp

***General-purpose AI problem-solving techniques***}

- Heuristic search (state-space and A* search, game-tree and alpha-beta pruning, etc.) (Chapters 3 - 6): **Lectures 4 – 7**
- Knowledge representation and reasoning (first-order-logic and automatic deduction, other representation paradigms such as rule-based systems, semantic nets and frame systems, forward and backward chaining, semantic web) (Chapters 7 – 10): **Lectures 8 – 13**

**Exam 1** (around mid October)

***Advanced topics and Applications***

- Planning (Chapters 11 & 12): **Lectures 14 – 16**
- Uncertainty and probabilistic reasoning (certainty factors in rule-based systems, simple Bayesian systems, Bayesian belief networks, fuzzy set theory, Dempster-Shafer theory) (Chapters 13 & 14): **Lectures 17 – 20**
- Decision (Chapter 16): **Lecture 21**
- Learning and knowledge acquisition (selected section from Chapters 18 – 21): **Lectures 22 – 23**

**Exam 2** (final exam time)

**Grading:** Course grading will be based on the following work:

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| Project 1 | 5% |
| Project 2 | 15% |
| Project 3 | 20% |
| Exam 1 | 30% |
| Exam 2 | 30% |

***Note on projects:***

- Project 1 is an exercise of Lisp. Project 2 is on knowledge representation and reasoning. It is highly advisable to use Lisp for Project 2 (you may use Prolog if you know the language). Project 3 is on application of your choice. You need to write a proposal on this project and get it approved by the instructor. You can use any language for Project 3.
- For each project, you are required to submit a written report as well as a hard copy of your source code and the output of the code execution.
- You must submit your project by the end of the class time on the due day. Projects submitted after that time will be considered late. A 10-point (out of 100) penalty will be applied to all projects that are late up to one week. No projects later than one week will be accepted.