CSE 494/598: Logic Programming (Fall 2008)

Time and Place: TTh 10:30 – 11:45 a.m., BYAC 240

Instructor: Joohyung Lee (joolee@asu.edu)

Instructor's Office Hours: W 5-6 p.m., F 1-2 p.m. and by appointment (preferably made at least one day before), BY 574

Description: Beyond the study of proofs in mathematics, logic has been applied to designing and reasoning about computer hardware and software. One of the prominent applications of logic in computer science is the use of logic for *declarative programming*. Declarative programming specifies *what* is to be computed, but not necessarily *how* it is computed.

Answer set programming (ASP) is a recent form of logic programming oriented towards difficult combinatorial search problems, and has found to be useful in many knowledge-intensive applications. It has emerged from interaction between two lines of research—on the semantics of negation in logic programming and on applications of satisfiability solvers to search problems. It was identified as a new programming paradigm in 1999.

The idea of ASP is to represent the search problem we are interested in as a logic program whose intended models, known as "answer sets", correspond to the solutions of the problem, and then find them using an *answer set solver* – a system for computing answer sets.

Applications of ASP include knowledge representation, plan generation, and product configuration problems in artificial intelligence and to graph-theoretic problems arising in VLSI design, in historical linguistics, and in bioinformatics. Fully declarative semantics of ASP makes it easy to write provably correct programs, and allows easy communication between other users of computational methods besides computer scientists. The significance of this new approach is heightened by the multidisciplinary nature of collaborations and new computing areas that are emerging. For example

- **Automated Product Configuration.** An ASP-based technology that has been commercialized (www.variantum.com/en).
- **Decision Support for the Space Shuttle.** An ASP system has been a part of autonomous control of the Space Shuttle.
- **Inferring Phylogenetic Trees** An ASP-based method for reconstructing a phylogeny for a set of taxa has been applied to historical analysis of languages and of parasite-host systems.

Other applications (showcases) are listed at

`http://www.kr.tuwien.ac.at/research/projects/WASP/showcase.html`

Course Materials Course materials will be handed out in class and will be posted at the course webpage:

`http://peace.eas.asu.edu/joolee/teaching/lp-f08` .

Grading The grade will be determined by class participation, homework and two tests and a term project.

Class participation	20%
Homework	20%
Two tests	15% each
Project	30%

Class Participation For problems announced for class discussion, you are expected to volunteer to present solutions to at least two problems at some times during the semester; in this way you get credit for class participation. This should be a solution that you found by yourself, without help from others.

Homework On Thursdays, you will receive e-mail messages with homework problems. When you work on these additional problems, you may consult the materials handed out in class and your notes, but not any books, and you should not accept any help.

Project The project is individual. You may choose your own topic, or the instructor will assist you in selecting one. More detailed instructions will be provided later.

Initial proposal	10%
Survey, progress report	30%
Final report	60%

The syllabus is subject to change if necessary.