

## **CMSI 682 KNOWLEDGE-BASED SYSTEMS**

Fall 2006 -- 3.0 units

Thursday 6:30 - 9:30 p.m. -- Doolan 222

Dr. Stephanie E. August -- saugust@lmu.edu

### **Course Description**

#### **Objectives**

The primary objective of this course is to introduce the fundamental concepts of knowledge-based systems, focusing on rule-based systems, and to provide experience in designing and implementing these systems. Among the topics to be covered are: logic and theorem proving, pattern matching, deduction systems, reaction systems, forward and backward chaining, knowledge acquisition, uncertainty management, and explanatory interfaces. Successful knowledge-based systems, such as SOAR, R1/XCON, and MYCIN, will be studied. Students will implement a simple knowledge-based system during the course of the semester using CLIPS. The secondary objective of the course is to learn how to research and review advances in the field.

#### **Required**

Knowledge of a higher level programming language, such as C++, Prolog, or Lisp.

#### **Recommended**

CMSI 677: Introduction to Artificial Intelligence

#### **Expected Work**

Readings prior to lectures and participation in class discussion.

Programming assignments and oral and written homework assignments to reinforce lectures and readings.

Term paper and oral report on a knowledge-based system topic TBD due mid-term.

Term project due at end of term.

Course information will be published on Blackboard. Students are expected to inspect the course Blackboard frequently for announcements, updates, assignments, and documents, and to use Blackboard to communicate among class members.

Students are also expected to complete a poster suitable for a conference presentation and participate in the Electrical Engineering and Computer Science Department end-of-semester poster presentation event.

#### **Exams**

One midterm and a final.

#### **Text and Required Materials**

*Expert Systems: Principles and Programming.* Joseph Giarratano and Gary Riley. 4<sup>th</sup> ed. Thomson Course Technology, 2005.

CLIPS expert system language, *CLIPS Basic Programming Guide*, and *CLIPS User's Guide*. These materials are available in electronic form at <http://www.ghg.net/clips>. They will also be made available in the Keck Lab.

Supplementary materials as posted on Blackboard or handed out in class.

**Additional References**

*Artificial Intelligence.* Patrick Henry Winston. 3rd edition. Addison-Wesley, Reading MA, 1992. *Artificial Intelligence.* Elaine Rich & Kevin Knight. 2nd edition. McGraw-Hill, New York, 1991.

*Artificial Intelligence: A Modern Approach.* Stuart J. Russell and Peter Norvig. Prentice-Hall, Englewood Cliffs, NJ, 2003.

*Building Large Knowledge-Based Systems: Representation and Inference in the CYC Project.* D.B. Lenat and R.V. Guha. Addison-Wesley, Reading, Massachusetts, 1990.

*The Engineering of Knowledge-Based Systems: Theory and Practice.* Avelino J. Gonzalez & Douglas D. Dankel. Prentice Hall, Englewood Cliffs, NJ, 1993.

*Introduction to Knowledge Systems.* Mark Stefik. Morgan Kaufmann Publisher, Inc., San Francisco, 1995.

*Knowledge-based Systems in Artificial Intelligence.* Randall Davis & Douglas B. Lenat. McGraw-Hill, New York, 1982.

**Grading**

Your final grade will be weighted as follows:

Assignments and Participation.....	20%
Knowledge-based System Report....	15%
Project.....	20%
Midterm.....	20%
Final.....	25%

Assignments include written, oral, and programming tasks. All assignments will be weighted equally. Larger programming assignments will be broken down into two or more equally weighted smaller assignments. Assignments are due at the beginning of class on the due date and reviewed in class on the due date. *1-3 extra credit homework points will be awarded for each seminar writeup.* When current events related to knowledge-based systems are in the news, student will have the opportunity to earn extra credit assignment points by giving oral and written reports on the events.

An incomplete will be granted only when the student requesting the incomplete has completed 80% of the coursework, and has at least a B average in the coursework completed.

Assignments are due at the beginning of class. Late assignments are not accepted.

Refer to the *Teaching Philosophy and Course Policies* handout for additional information.

**Office Hour/Contact Points**

*Office Hours:* Monday, Wednesday, Friday, 2-3 p.m.  
 Monday and Thursday, 5:30 - 6:30 p.m.  
 and *by appointment.*

*Office:* Doolan 108

*Phone:* (310) 338-5973

*Internet:* saugust@lmu.edu Put **\*\*\* CMSI 682 Class \*\*\*** in the subject line!!!

**Change history:**

- 8 JAN 2003      S.E. August
- . Changed required and reference texts
  - . Updated all sections and added Philosophy statement.
  - . Changed “Short written report” to “written report” under expected work, because the report is 10% of grade.