King Fahd University of Petroleum & Minerals

College of Computer Sciences and Engineering

Information and Computer Science Department

ICS 381: Principles of Artificial Intelligence (3-0-3)

Syllabus – Fall Semester 2012-2013 (121)

Website: Blackboard (WebCT) http://webcourses.kfupm.edu.sa

Class Time, Venue and Instructor Information:

Time	Venue	Instructor	Office Hours
SMW 11:00-11:50am	24/141	**Dr. EL-SAYED EL-ALFY** Office: 22-108 Phone: 03-860-1930 E-mail: alfy@kfupm.edu.sa, http:faculty.kfupm.edu.sa/ics/alfy	Announced on Blackboard

Course Catalog Description

Introduction to Artificial Intelligence (AI), history and applications; First order logic; State space representation; Blind and heuristic search; Constraint satisfaction and planning; Knowledge representation; Reasoning in uncertain situations; Machine learning; Prolog programming; Natural language processing; Expert systems and real AI applications.

Pre-requisites: ICS 253: Discrete Structures I (or Equivalent)

Course Objectives

- Provide students with in-depth knowledge of important concepts, problems solving, and techniques in AI.
- Introduce students to the basic toolkit of AI algorithms and representation methods that can be applied to a wide variety of real world problems.

Course Learning Outcomes

Upon completion of the course, you should be able to:

1. Differentiate and analyze the concepts of optimal reasoning and optimal behavior compared to human-like reasoning and behavior.
2. Design, implement, and evaluate uninformed, heuristic, and adversarial search algorithms, such as depth-first, A*, Minimax, and alpha-beta pruning.
3. Apply knowledge-based reasoning through modeling of resolution, propositional and predicate logic, and probabilistic modeling.
4. Transform AI algorithms (e.g., A*, IDA*, Genetic Algorithm) into any programming language (e.g., Python, C#, Java, etc.)
5. Apply basic AI algorithms, techniques and representation methods to a wide variety of real world problems.

Required Material

- Artificial Intelligence: A Modern Approach, 3/E. By Stuart Russell & Peter Norvig, Prentice Hall, 2010. http://aima.cs.berkeley.edu/
- Lecture Handouts
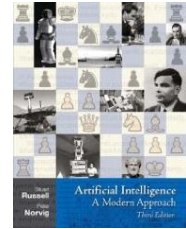
Other Recommended References

- Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6/E. By George F. Luger, Addison-Wesley Publisher, 2009. http://wps.aw.com/aw_luger_ai_6/
- Artificial Intelligence: A Guide to Intelligent Systems, 2/E. By Michael Negnevitsky, Addison-Wesley Publisher, 2005.
- AI Algorithms, Data Structures and Idioms in Prolog, Lisp and Java. By G.F. Luger & W.A. Stubblefield, Pearson Education, 2009. http://wps.aw.com/wps/media/objects/5771/5909832/PDF/Luger_0136070477_1.pdf
- Prolog Programming for Artificial Intelligence, 4/E. Ivan Bratko, Addison-Wesley Publisher, 2012.
- An Introduction to Prolog Programming, Lecture Notes, King's College London and University of Amsterdam, 1999-2007. http://staff.science.uva.nl/~ulle/teaching/prolog/prolog.pdf

Assessment Plan

Assessment Tool	Weight
Class work: Homework/Programming Assignments & Quizzes, Participation, etc.	18%
Term Project	12%
Major Exam I (6th Week, Wed.)	20%
Major Exam II (11th Week, Wed.)	20%
Final Exam (semi-comprehensive) [Date: as announced by the registrar; Tuesday Jan. 1, 2013 @7:30am]	30%

Tentative Schedule

#	Topics	Ref. selected topics	Additional Activities
1	Introduction to AI, history and applications	Ch. 1	
2	Intelligent agents & Expert systems	Ch. 2	
3	Languages and programming techniques for AI (Prolog, Lisp, Python)	Extra handout	
4	Problem solving by searching: Uninformed and informed search, local search	Ch. 3, 4	
5	Adversarial search	Ch. 5	
6	Constraint satisfaction problems	Ch. 6	
7	Knowledge representation and reasoning: propositional and first-order logic	Ch. 7, 8, 9	
8	Planning and acting	Ch. 10, 11	
9	Reasoning in uncertain situations	Ch. 13, 14	
10	Machine learning	Ch. 18, 20, 21	
11	Natural language processing	Ch. 22, 23	
12	Other applications of AI (Perception, Vision, Robotics)	Ch. 24, 25	

Course Policies

- *Course website & participation*: Students are required to periodically check the course website and download course material as needed. Several resources will be posted through the website as well. WebCT will be used for communication and interaction, posting and submitting assignments, posting grades, posting sample exams, etc. It is expected that you get benefit from the discussion board by raising questions or answering questions put by others.
- *Attendance*: Regular attendance is a university requirement; hence attendance will be checked at the beginning of each lecture. Late arrivals will disrupt the class session. Hence, two late attendances will be considered as one absence. Missing more than <u>9 unexcused lectures</u> will result in a <u>DN grade without prior warning</u>. To avoid being considered as absent, an official excuse must be shown no later than one week of returning to classes.
- *No makeup of homework, quizzes or exams will be given.*
- *Re-grading policy*: If you have a complaint about any of your grades, discuss it with the instructor no later than a week of distributing the grades (except for the final which should be before disclosing grades on the announced date). Only legitimate concerns on grading should be discussed.
- *Term project*: More information will be posted in WebCT later.
- *Office hours*: Students are encouraged to use the office hours to clarify any part of the material that is not clear; however the instructor will only provide hints if it is an assigned task but not solve it.
- *Academic honesty*: Students are expected to abide by all the university regulations on academic honesty. Cheating will be reported to the Department Chairman and will be severely penalized. Although collaboration and sharing knowledge is highly encouraged, copying others' work without proper citation, either in part or full, is considered plagiarism. Whenever in doubt, review the university guidelines or consult the instructor. <u>Cheating in whatever form will result in F grade.</u>
- *Courtesy*: Students are expected to be courteous toward the instructor and their classmates throughout the duration of this course. Talking while someone else is speaking will not be tolerated. Furthermore, all cell phones must be turned off during class and exams. In addition, students are expected to be in class on time. More importantly, you are not allowed to leave the class unless it is an urgent matter. To contact your instructor, please use email through WebCT whenever possible and avoid using phone calls or written notes.

⊙⊙⊙ **Best luck!!** ⊙⊙⊙