RAI 933 Advanced Artificial Intelligence (3-0)

Textbook: *Artificial Intelligence: A Modern Approach (2nd Edition)*, by Russel and Norvig, Prentice Hall, 2002. ISBN-10: 0137903952, ISBN-13: 978-0137903955

Reference Books:

• Artificial Intelligence Structures and Strategies for Complex Problem Solving by George

F Lugar, Addison Wesley, 4th Ed 2002

• Artificial Intelligence: A New Syn   thesis by Nils Nilsson, Morgan Kaufman, 1997.

Pre-Requisite:

CSE 860   Artificial Intelligence   (or equivalent)

Objective:

The objective of this course is to cover the basic topics in uncertain reasoning and machine learning that are commonly used in modern artificial intelligence. Emphasis will be on concepts and algorithms and not on "cookbook" techniques or current commercial systems.

Course Outcome:

Students completing this course are expected to have developed a firm knowledge base of state of the art artificial intelligence algorithms.

Course Outline:

Following is a list of topics expected to be covered, in anticipated order, and with expected time to be spent on them. This list is intended to be only indicative, the actual topics, the order and the time may vary somewhat depending on various factors including student interests and preparation.

Topics	Allocated Periods
Introduction Background, requirements, topics to be covered, conduct of the class **Introduction to Probability Theory** Probability definitions, Bayes rule and its applications **Probabilistic Reasoning** Bayesian networks: representation and inference, Belief Propagation, MCMC algorithm, other methods **Probabilistic Reasoning over Time** Hidden Markov Models, Dynamic Bayesian networks **Probabilistic Reasoning over Time** Utility theory, Decision networks **Making Complex Decisions** Sequential decision problems, Partially observable Markov decision problems (POMDPs) **Learning from Observations** Inductive learning, decision trees, ensemble learning **Statistical Learning** Complete data, Hidden nodes (EM method), Instance based learning, Neural networks **Reinforcement Learning** Passive and active	45