CSCI 446 – ARTIFICIAL INTELLIGENCE
EXAM 1 STUDY OUTLINE

Uncertainty

I. Uncertainty
- A. Sources of Uncertainty
- B. Methods for Handling Uncertainty

II. Probability
- A. Terms
  - 1. Sample Space
  - 2. Event
  - 3. Random Variables
  - 4. Propositions

III. Syntax and Semantics
- A. Prior Probability
- B. Joint Probability
- C. Conditional Probability

IV. Inference
- A. Enumeration
  - 1. Normalization

V. Independence
- A. Absolute
- B. Conditional

VI. Bayes' Rule

Bayesian Networks

I. Syntax
- A. Nodes
- B. Directed Arcs
- C. Conditional Probabilities

II. Semantics
- A. Global and Local
- B. Constructing a Bayes Net

III. Inference
- A. Enumeration

Rational Decisions

I. Rational Preferences

II. Utility
- A. Assessment of Human Utility

III. Decision Networks
- A. Decision Node
- B. Chance Node
- C. Utility Node

IV. Dominance
    A. Strict Dominance
    B. Stochastic Dominance
V. Value of Information

Machine Learning
I. Learning Agents
    A. Architecture
    B. Learning Element
    C. Supervised/Unsupervised Learning
II. Inductive Learning
    A. Approximate f(x) with h(x)
    B. Overfitting
    C. Generalization
    D. Structural Representations
        1. Decision Trees
        2. Rules
        3. Numeric
    E. Algorithms
        1. Decision Trees – Information Theory / Entropy
        2. Rules – Instance Covering
        3. Artificial Neural Networks
            a. Multilayer Perceptron
                1. Feed Forward
                2. Backpropagation
            b. Kohonen Net
        4. Case Based Learning
        5. Clustering
III. Genetic Algorithms
    A. Encoding / Representation
    B. Evaluation / Fitness Function
    C. Development Process
    D. Genetic Operators
        1. Selection / Reproduction
        2. Crossover
        3. Mutation
III. Measuring Performance
    A. Learning Curve
    B. Training Set / Test Set (and Validation Set)
    C. Estimating the Error (Confidence)
    D. Comparing Models

Philosophical and Ethical Issues
I. Weak AI
II. Strong AI
III. Ethics