

**CSCI 446 – ARTIFICIAL INTELLIGENCE
EXAM 2 STUDY OUTLINE**

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. Algorithms
 - 1. Decision Trees – Information Theory / Entropy
 - 2. Rules – Instance Covering
 - 3. Instance Based:
 - a. Clustering
 - b. Case (Instance) Based Learning
 - 3. Neural Networks
 - 4. Genetic Algorithms

III. Measuring Performance

- A. Learning Curve
- B. Training Set / Test Set

Planning

I. Search vs. Planning

- A. Actions, States, Goals, Plans
- B. Situational Calculus

II. STRIPS Operators

- A. Initial and Final States
- B. Operators
 - 1. Action
 - 2. Preconditions
 - 3. Effects (Postconditions)

III. Partial-Order Planning

IV. The Real World

- A. When Things go Wrong
 - 1. Incomplete Information
 - 2. Incorrect Information
 - 3. Qualification Problem

V. Conditional Planning

VI. Monitoring and Replanning

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
 - B. Variable Elimination
 - C. Sampling
- Decision Networks**
- I. Utility
 - A. Assessment of Human Utility
- II. Decision Networks
 - A. Decision Node
 - B. Chance Node
 - C. Utility Node
- III. Value of Information
 - A. Properties
 - B. Qualitative Behaviors
- Philosophical and Ethical Issues**
- I. Weak AI
- II. Strong AI
- III. Ethics