

Midterm Study Guide

Midterm Time and Place:

- Friday, March 1, 10:10am – 11am
- STEPS 490 (*our usual room*)

Format:

The test will be held in class. You can expect the following types of questions: true/false, short answer, and smaller versions of homework problems. It will be closed book and closed notes. However, you may bring one 8 ½ x 11” “cheat sheet” with handwritten notes on one-side only. Also, all calculators, PDAs, portable audio players (e.g., iPods) and cell phones must be put away for the duration of the test.

Coverage:

In general, anything from the assigned reading or lecture could be on the test. In order to help you focus, I have provided a **partial list** of topics that you should know below. In some cases, I have explicitly listed topics that you do not need to know. In addition, you do not need to reproduce the pseudo-code for any algorithm, but you should be able to apply the principles of the major algorithms to a problem as we have done in class and on the homework.

- Ch. 1 – Introduction
 - rationality
 - definitions of “artificial intelligence”
 - The Turing Test
 - **you do not need to know:**
 - dates and history
- Ch. 2 - Agents
 - PEAS descriptions
 - performance measure, environment, actuators, sensors
 - properties of task environments
 - fully observable vs. partially observable, deterministic vs. stochastic vs, strategic, episodic vs. sequential, static vs. dynamic, discrete vs. continuous, single agent vs. multiagent, known vs. unknown
 - agent architectures
 - simple reflex agents, goal-based agents, utility-based agents
 - state representations
 - atomic, factored, structured
 - **you do not need to know:**
 - learning agents
- Ch. 3 – Search
 - problem description
 - initial state, actions, transition model, goal test, path cost/step cost
 - tree search
 - expanding nodes, frontier
 - branching factor
 - graph search
 - explored set
 - uninformed search strategies
 - breadth-first, depth-first, uniform cost
 - similarities and differences / benefits and tradeoffs between strategies
 - evaluation criteria
 - completeness, optimality, time complexity, space complexity

- best first search
 - evaluation function
- informed search
 - heuristics
 - greedy best-first, A*
 - admissible heuristics
 - similarities and differences / benefits and tradeoffs between strategies
- **you do not need to know:**
 - depth-limited, iterative deepening or bidirectional search
 - details of proof that A* is optimal if $h(n)$ is admissible
 - memory bounded heuristic search
 - learning heuristics from experience
- Ch. 5 - Game playing (Sect. 5.1-5.2, 5.4, 5.7-5.9)
 - two-player zero-sum games
 - problem description
 - initial state, actions, transition model, terminal test, utility function
 - minimax algorithm
 - optimal decision vs. imperfect real-time decisions
 - evaluation function, cutoff-test
 - **you do not need to know:**
 - alpha-beta pruning
 - forward pruning
 - details of any state-of-the-art game playing programs
- Ch. 7 – Logical Agents (Sect. 7.1-7.4, 7.5.3-7.5.4, 7.7-7.8)
 - knowledge-based agents
 - TELL, ASK
 - propositional logic
 - syntax and semantics
 - entailment, models, truth tables
 - model checking
 - inference procedures
 - forward-chaining
 - backward-chaining
 - sound, complete
 - **you do not need to know:**
 - details of the Wumpus world
 - circuit-based agents
- Ch. 8 – First-Order Logic
 - syntax and semantics
 - be able to translate English sentences into logic sentences
 - quantification
 - existential, universal
 - domain, model, interpretation
 - equality/inequality
 - making statements about quantity (e.g., exactly two brothers)
 - **you do not need to know:**
 - specific axioms from the domains given in class or the book

- “Intro to Prolog Programming” Reading, Ch. 1
 - syntax
 - be able to write rules and facts in Prolog
 - translating to FOL and vice versa
 - negation as failure / closed world assumption
 - backward-chaining, depth-first search
 - be able to find the answers to a goal given a simple Prolog program
- Ch. 9 – Inference in First-Order Logic (Sect. 9.1-9.2, 9.4)
 - substitution, unification
 - most general unifier
 - backward-chaining
 - pros / cons
 - diagramming inference process
 - negation as failure
 - **you do not need to know:**
 - inference rules, skolemization
 - constraint logic programming