

CPSC 481 Midterm Exam Study Guide

Spring 2023

The midterm will take place on **Thursday, March 23 during class hours on Canvas**. (You do not have to be on Zoom; I will be on Zoom however if you have any clarifying questions.) The exam will cover the material until Adversarial search.

The class on Tuesday, 3/21 will be a **review session**. Please be prepared to ask questions based on this study guide. The exam is open-notes (including class powerpoint slides) and open textbook. The best way to prepare for the exam is going through the homework and classwork assignments. You will not be expected to write Python code.

The following material is fair game:

1. State space representation
 - a. Properties of task environments
 - b. State space graph
 - c. State space complexity
 - d. Operators in a state
 - e. Branching factor
2. Uninformed search algorithms
 - a. Depth-first tree search
 - b. Depth-first graph search
 - c. Depth-limited depth-first search
 - d. Breadth-first graph search
 - e. Iterative deepening depth-first search
 - f. Properties of algorithms
 - i. Time complexity
 - ii. Space complexity
 - iii. Completeness
 - iv. Optimality
 - g. Trade-offs between algorithms
3. Informed search algorithms
 - a. Path cost
 - b. Uniform-cost search
 - c. Greedy breadth-first search
 - d. A* search
 - e. Heuristic functions
 - i. Properties of heuristic functions
 1. Admissible
 - ii. Creating heuristics from relaxed problems
 - iii. Comparing heuristic functions

- f. Properties of algorithms
 - g. Trade-offs between algorithms
- 4. Adversarial search
 - a. Types of games
 - b. Game trees for 2-player games
 - c. Utility of a state
 - d. Minimax algorithm to compute utility
 - e. Selecting optimal move based on utility
 - f. Properties of minimax strategy
 - g. Depth-limited minimax
 - h. Evaluation function
 - i. Alpha-beta pruning
 - j. Properties of alpha-beta pruning
 - k. Node ordering