

LOGISTICS

The exam is a take-home exam. It will be posted on Canvas on Oct 5/6. Submission will either be on Canvas or via Gradescope: stay tuned for details on this. It is due Monday, October 12, at 11:59. There are no late days available for this exam. Your answers may be typeset (using LaTeX or a Jupyter notebook) or handwritten (preferably on a **printed** copy of the exam).

After typing up or hand writing your answers, you'll need to get them into a .pdf. You may take pictures with e.g. a phone or scan them in, and then you will have to upload them online.

TEST STRUCTURE

You should expect a test of around:

5-8 Multi-part Questions. Each will be 2-5 parts, which may include:

- T/F questions
- Short Answers
- Free Responses (e.g. Drawing State Graphs/Trees, etc.)

Content covers all of lecture through Wednesday, October 7.

NON-EXHAUSTING LIST OF CONCEPTS

Note that this is an incomplete guide through the material we have covered thus far in CSCI 3202. It is not meant to be an exhaustive listing of material to study for the midterm exam.

Agents

- This class is called “artificial intelligence”... agents are the formal name for the entities that we want to be artificially intelligent. Here, we laid out a bunch of formal terms for things like:
 - Types of agents (model-based, reflex, and others...)
 - Types of task environments (and what a task environment is)
 - The description of the decision landscape (known/unknown, observable/unobservable, stochastic/deterministic, etc.)
- State spaces – what are all the possible configurations of “the world”?

Decision Analysis (some to be covered the week before the exam!)

- From Agents, a natural next place to go is to open the hood on the decisions that an Agent might make. If you are going to define the decision landscape for, say, a hydroelectric dam, or for an algorithm's default behavior, you ought to know what the consequences are.
- Expected loss
 - Get expected value of loss function, with respect to whatever the prior distribution for our uncertain decision variable is

- Bayes' decision
 - The decision that minimizes our expected loss function
 - Either by taking a derivative and setting equal to 0, or by evaluating the loss function at all the possible options and picking the minimum
- EVPI, EVIU – how to calculate, and what they mean
 - EVPI = the expected cost of being uncertain at all about x (uncertain decision variable)...
 - EVIU = the additional cost of pretending that we are not uncertain

Uninformed Search

- BFS, DFS, UCS
- Want to know: complexity, completeness, optimality, strengths and weaknesses
- Can compute: which nodes each expands, in which order to find solution path. Given some search ordering... does it depend on ordering?

Informed Search

- Greedy, A^* , optimality.
- About heuristics
 - (a) Definitions and classifications: admissible and consistent
 - (b) How might we choose a good heuristic function?
- Want to know: complexity, completeness, optimality, strengths and weaknesses
- Can compute: which nodes each expands, in which order to find solution path. Given some search ordering... does it depend on ordering?

Local Search

- Hill-climbing, simulated annealing, local beam search, genetic algorithms
- How does each work? How are they similar/different? How will their performance on a particular problem differ? What are the design choices, e.g. step size, mutation probabilities, etc. for each?
- Can you interpret given code/what might be going on at each step?

Games

- Game trees and adversarial search
- Minimax algorithm
 - Given a game tree, what is the minimax choice at each stage?
 - If each player plays optimally, how will the game proceed?
- Alpha-beta pruning: what is it and what branches/leaves would be pruned for a given game tree?

OK WHAT DO I DO

- Review homework problems and in-class notebooks. Reattempt tricky ones. Solutions to HW1 and 2 will be posted on the course schedule.
- Review the slides! The in-class examples will often not be dissimilar to the questions on the exam: can you do those examples we worked out in class?
- If a concept is unclear, ask questions.

- Office hours are posted both on the course syllabus (Canvas) and on Piazza.
 - I'm also available for office hours by appointment (groups could be good for this!) if none of the hours work for you.
 - Piazza is great! There are lots of students and questions are often repeated. Once the exam is posted, don't make posts about *exactly* an exam question, but instead ask about e.g. the example exam that's linked on the course schedule, or in-class examples. The problems will mostly be similar!
- Attend/watch the brief review we'll do in class on Friday, Oct 9.
 - Don't stress how long it will take. It's modeled to be an exam that *would* take about 90 minutes to do in a regular test-taking environment. Instead, you'll have almost a week to do it!