

# ECE209AS (Fall 2025)

## Computational Robotics

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### Problem set 4 | Graph search based motion planning

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Due Tue, Oct 21, 2025 @ 9am PT

## Key takeaways

After this lecture, you should understand:

- What restrictions atop general MDPs are needed for a problem to fall into the class of “motion planning”;
- Why those restrictions allow us to use other planning algorithms (i.e. graph search), and why we would want to use those algorithms instead of exact (general) MDP methods; and
- How to develop, configure, and implement a variety of exact and approximate graph-based methods for planning on such problems.

## Assignment

- 4(a). Come up with a planning problem for which a graph-search based approach (either exact or probabilistic) might NOT be the most appropriate solution method, despite the problem having the following characteristics:
- The system is deterministic.
  - The system state is based on its position/orientation within the environment.
  - The task has no urgency/time limit.

In two to three English sentences, explain why graph search based approaches are less effective on your problem.

- 4(b). In two to three English sentences, explain how might you reframe that problem (i.e. define an alternative mathematical representation) so that you nonetheless use a graph-search based approach to solve that very problem.

- 4(c). Would you be willing to let us use your correct responses as (anonymized) examples for the class?