

# ECE183DA (Winter 2022)

## Design of Robotic Systems I

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### Lecture 3 | Discretization and function approximation

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#### Addendum to lecture videos

#### Clarification

When coming up with features for function approximation, you have the option of what basis functions to use. You could choose to have a generic, universal, unbiased set of functions (e.g. polynomial regression, Fourier series, neural net), or you could instead hand-craft a set of features targetted towards the problem you are trying to solve (distance to the ice cream store, points scored, etc.). Similar to the dangers of reward-shaping, you will likely influence the policy you discover by your choice of basis functions.

However, you will be using this basis to approximate the value, which explicitly characterizes the policy (= how to achieve the goal), and so this influence is more overt and even sometimes desired (so that you can reduce computation and settle for a not-quite-optimal-but-good-enough policy). In contrast, the reward is meant to characterize the goal (and not how to achieve it); if you changed that based on an assumed policy, you would be incorrect in then claiming that your MDP solution was actually an optimal policy.

#### Additional References

- This material is covered in [Pieter Abbeel's CS287 at UC Berkeley](#) with slightly different notation in lectures 3 and 4.
  - <https://people.eecs.berkeley.edu/~pabbeel/cs287-fa19/>