EC 700: Introduction to Reinforcement Learning
Spring 2021

Instructor Information

Name: Alex Olshevsky
Office: PHO 531
Email: alexols@bu.edu
Office Hours: TBD

Class Information

Time: MW 2:30-4:15
Classroom: CGS 129
Course Webpage: http://sites.bu.edu/aolshevsky/foundations-of-reinforcement-learning/

Course Description

Reinforcement learning is a subfield of artificial intelligence which deals with learning from repeated interactions with an environment. Reinforcement learning is the basis for state-of-the-art algorithms for playing strategy games such as Chess, Go, Backgammon, and Starcraft, as well as a number of problems throughout robotics, operations research, and other fields of engineering. In this course, we will study the fundamental algorithms of reinforcement learning. Our goal will be to understand the mathematical principles underlying these algorithms and to test them on several popular benchmarks.

The class will be very math-heavy. You will have some programming homeworks, but you can expect to spend the majority of your time studying the mathematical theory underlying the algorithms.

Prerequisites: Knowledge of probability theory and linear algebra at the graduate level.

Course Outline

3. Function Approximation in RL. Neural Networks and Nonlinear Function Approximation.
5. Exploration/Exploitation Tradeoffs, Sample Complexity Issues, Distributing RL.
A selection of good resources are listed at the course webpage. This class is most similar to CS 598 at the University of Illinois at Urbana-Champaign, and you may choose to look at the lecture videos of that class to get a feel for the topics we’ll cover as well as for the mathematical level of the class.

Grading

- Homeworks: 35%
- Programming assignments: 20%
- Quizzes: 15%
- Final Project: 30%

Your lowest homework grade will be dropped, along with your lowest programming assignment grade, and your lowest quiz.

You can consult the course notes during a quiz. However, you may not consult any online resources during a quiz.
There will be no make-up quizzes, even in the case of an emergency. A missed quiz counts as a zero unless a valid excuse from a physician is presented. With an acceptable written excuse, a missed exam will be dropped from the computation of the final grade.

**Academic Policy**

BU takes academic integrity very seriously. Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments, or impedes other students’s opportunities of being judged fairly for their academic work. Knowingly allowing others to represent your work as their own is as serious an offense as submitting another’s work as your own. More information on BU’s Academic Conduct Code, with examples, may be found at [http://www.bu.edu/academics/policies/academic-conduct-code](http://www.bu.edu/academics/policies/academic-conduct-code)

**Collaboration Policy**

In this class you may use any textbooks or web sources when completing your homework and programming exercises. You may also use human collaborators from class subject to the following strictly enforced conditions:

- You must clearly acknowledge all your sources (including your collaborators) on the top of your homework.
- You must write all answers in your own words.
- You must write your own code.
- You must be able to fully explain your answers upon demand.
- You may not use any human resource outside of class (including web-based help services, outside tutors, etc) in doing your homeworks or programming exercise.
- Obviously, you may not collaborate with anyone on quizzes.

Failure to meet any of the above conditions would constitute plagiarism and will be considered cheating in this class. If you are not sure whether something is permitted by the course policy, ASK ME! (it’s much more awkward to explain your actions after the fact to the college disciplinary committee). The penalty for academic misconduct at BU is severe.

**Grade Scale**

Final grades will be assigned according to the following scale:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93 – 100</td>
</tr>
<tr>
<td>A-</td>
<td>90 – 92</td>
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<tr>
<td>B+</td>
<td>87 – 89</td>
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<tr>
<td>B</td>
<td>83 – 86</td>
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<td>B-</td>
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<td>C-</td>
<td>70 – 72</td>
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<td>D</td>
<td>60 – 69</td>
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<tr>
<td>F</td>
<td>0 – 59</td>
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However, I may curve up the grades on individual assignments or quizzes.
Incomplete Grades

Incomplete grades will not be given to students who wish to improve their grade by taking the course in a subsequent semester. An incomplete grade may be given for medical reasons if a physician’s note is provided. The purpose of an incomplete grade is to allow a student who has a legitimate interruption in the course to complete the remaining material in another semester. In particular, students will not be given an opportunity to improve their grade by doing “extra work.”

Drop Date

Students are responsible for being aware of the drop dates for the current semester. Drop forms will not be back-dated.