Department of Mathematics & Statistics
Concordia University

STAT 497 (MACF 491/MAST 679/MAST 881), Sec. L
Topics in Mathematics & Statistics: Reinforcement Learning
Topics In Mathematics & Computational Finance
Winter 2024

Instructor: Prof. Yang Lu, Office: LB 921-21 (SGW), Phone: 848-2424, Ext. 2948
Email: yang.lu@concordia.ca

Office Hours: Mondays and Wednesdays, 11:00-13:00.

Class Schedule: Mondays and Wednesdays, 13h15-14h30.

Textbook: *Reinforcement Learning: An Introduction*, by R.S. Sutton and A.G. Barto, 2nd Edition, MIT Press. Available for free online at http://incompleteideas.net/book/the-book-2nd.html

Outline: This course is an introduction to reinforcement learning techniques. It requires extensive programming with the R language. Topics covered include:

- Multi-armed bandit problem
- Markov Decision Problems
- Dynamic Programming
- Monte-Carlo solution methods
- Temporal difference methods
- Multi-period
- Approximation methods
- Policy gradient

Evaluation: The course mark will be determined by a midterm exam (35%), assignments (35% weight) and a project (30% weight).

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property

Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.