Sums 707– Basic Reinforcement Learning
Elementary Theory and Applications — Winter 2021

Course Schedule

Week 1	Jan 4	Introduction to RL, bandits, MDPs	Gabriela
Week 2	Jan 11	Bellman operator, Banach's fixed point, solving MDPs	Gabriela
Week 3	Jan 18	Model-free prediction and control, TD methods, Q	Viet
Week 4	Jan 25	Thicc state spaces: function approximation, deep RL	Viet
Week 5	Feb 1	Policy gradient methods, PG theorem, actor critic	Gabriela
Week 6	Feb 8	Temporal abstraction, options	Gabriela
Week 7	Feb 15	State abstraction, frontiers	Gabriela
Week 8	Feb 22	Hamilton-Jacobi equations, optimal control	Shereen
Week 9	Mar 1	No class - reading week	-
Week 10	Mar 8	Exploration: regret, optimism, posterior sampling	Viet
Week 11	Mar 15	Deep exploration: neural nets for thicc state spaces	Viet
Week 12	Mar 22	Provably efficient exploration, frontiers	Viet
Week 13	Mar 29	Weird markov chains and discrete stuff	Anna
Week 14	Apr 5	Trees propaganda: how to mingle with botanists	Anna

Important academic dates and information

Classes start: Jan 4
Reading week: Mon-Fri, Mar 1-5
Classes end: Apr 13
Lecture duration: 1.5 hours

Remark: The lecture schedule is tentative. The exact dates on which lectures will happen may change depending on the enrolled students' schedules. More details on this later.

Remark: Anna is our guest lecturer for the final weeks. She emphasizes that trees are scary but also cool. We find this hobby of hers to be a weird one but nevertheless give her the time slot.

Remark: Concentration inequalities are the next coolest human invention after the wheel, the steam engine, and sheaf cohomology. We assume knowledge of elementary concentration inequalities.

Remark: Our TA finds it hard to resist the temptation of converting us into her PDEs minions.

A small but important remark: "Basic" in the course title refers to the acidity of the course, in our case, it means that the pH of the course is ≥ 7.0.

Remark: The title of the course is a tribute to André Weil.