

# CSE 257: Search and Optimization (Winter 2023)

Instructor: Sicun Gao

## Schedule

- Week 1: Numerical Optimization (I)  
(first-order and second-order directions, various acceleration, line search, trust region)
- Week 2: Stochastic Search  
(Simulated annealing, cross-entropy methods, search gradients)
- Week 3: Classical Search  
(Heuristic search, adversarial search, motion planning)
- Week 4: Reinforcement Learning (I)  
(MDP, value and policy iteration, Monte Carlo and Temporal-Difference methods, Q-learning)
- Week 5: Reinforcement Learning (II)  
(Deep Q-learning, policy gradient, policy improvement, advantage estimation)
- Week 6: Bandits and Monte Carlo Tree Search  
(Concentration bounds, regret, upper confidence bound, MCTS, AlphaGo)
- Week 7: Numerical Optimization (II)  
(Constrained optimization, gradient projection, Lagrange duality, KKT)
- Week 8: Combinatorial Search (I)  
(Constraint solving, SAT, conflict-driven backtracking)
- Week 9: Combinatorial Search (II)  
(Integer programming, cutting planes, general nonlinear problems)
- Week 10: Presentations

## Grading

- Assignments: 70 Points
- Final: 30 Points
- Extra credits for projects: up to 10 Points