Unit 5: Constrained Optimization with Calculus   KEY

Title	Topics	Prior knowledge	Equipment	Sequence	Slides	Practice Problems	Time
5.1 intro	• background • setup + graphing feasible region	• Algebra • 3D graphing	C+L	SA	19	5	1.5
5.2 foundations	• descent and feasible cones • conditions for optimality	• gradients and Hessians • vectors	0	5.1	20	6	2
5.3 phase 1	• finding steepest descent vector • limiting the scalar • minimizing	• gradients and Hessians • vectors	C+L	2.4, 1.10 or 4.3, 5.1, 5.2	16	6	2
5.4 phase 2	• vector normalization • moving along constraint boundary to minimize • handling corner regions	• gradients and Hessians • vectors	C+L	5.1-5.3	21	5	2
5.5 big problems	• solving from equations to finish	• gradients and Hessians • vectors	C+L	5.1-5.4	7	2	2
5.6 penalty functions	• quadratic loss functions: set up and solve	• Algebra 2	C+L	2.3, 2.4	21	5	2
5.7 interior penalty	• barrier functions: set up and solve	• Algebra 2	C+L	5.6	13	4	1.5
5.8 Pareto	• design and criterion space • Pareto front and improvements	• Algebra 2	0	3.1	22	6	2
5.9 MDPs	• Markov Property • Markov Decision Processes • Partially Observable MDPs	• Algebra	C+L	SA	24	6	2

Total time, not including assessment/extra: 17 days