

LEC #	TOPICS	NOTES
1	Nonlinear optimization: unconstrained nonlinear optimization, line search methods	
2	Nonlinear optimization: constrained nonlinear optimization, Lagrange multipliers Penalty/barrier functions are also often used, but will not be discussed here.	
3	Dynamic programming: principle of optimality, dynamic programming, discrete LQR	
4	HJB equation: differential pressure in continuous time, HJB equation, continuous LQR	
5	Calculus of variations Most books cover this material well, but Kirk (chapter 4) does a particularly nice job.	
6	Calculus of variations applied to optimal control	
7	Numerical solution in MATLAB	
8	Properties of optimal control solution Bryson and Ho, Section 3.5 and Kirk, Section 4.4	
9	Constrained optimal control Bryson and Ho, section 3.x and Kirk, section 5.3	
10	Estimators/Observers Bryson, chapter 12 and Gelb, Optimal Estimation	
11	Stochastic optimal control Kwakernaak and Sivan, chapters 3.6, 5; Bryson, chapter 14; and Stengel, chapter 5	
12	LQG robustness Stengel, chapter 6	

LEC #	TOPICS	NOTES
	Question: how well do the large gain and phase margins discussed for LQR map over to LQG?	
13	Feedback Control Systems: multiple-input multiple-output (MIMO) systems, singular value decomposition	
14	Signals and system norms: H_∞ synthesis, different type of optimal controller	
15	Model predictive control	