EE 618 **Fall 2015**

Dynamic Programming and Stochastic Control

MW 10:30-11:45am, HOLM 388

Class Information

This is a fundamental graduate-level course on optimal sequential decision making. It builds on an introductory undergraduate course in probability, and emphasizes Dynamic Programming to obtain optimal sequence of decision rules. Some familiarity with dynamic systems would enhance appreciation, but the necessary material will be reviewed during the course. The sequential decision making model we consider encompasses a wide range of applications. Inventory control, communication models, scheduling, asset selling, queueing applications, search problems, auction algorithm, Kalman filtering, shortest path problems, resource allocation, finance, routing, sequential hypothesis testing are just to name few.

Instructor:	Gurdal Arslan, Holmes 440, Phone: 956–3432, E-mail: `gurdal@hawaii.edu`
Office Hours:	anytime
Text:	Dynamic Programming and Optimal Control by Bertsekas, Volume 1
Webpage:	Follow the links from `http://www2.hawaii.edu/~gurdal/` Site of announcements, handouts, homeworks, etc.
Grading:	Homework 25% + Mid-term I 25% + Mid-term II 25% + Final Exam 25%, or Homework 25% + Final Exam 75%, whichever is higher.
Exam Dates:	Mid-term I: Wednesday, September 30, 2015 (tentative), in class. Mid-term II: Wednesday, November 4, 2015 (tentative), in class. Final Exam: Monday, December 14, 2015, 9:45-11:45am, in class.
Policies:	No credit will be given to late homeworks. Exams must be taken at the announced times.

Topics (Tentative)

- The Dynamic Programming Algorithm (Chapter 1)
- Deterministic Systems and Shortest Path Problem (Chapter 2)
- Problems with Perfect State Information (Chapter 4)
- Problems with Imperfect State Information (Chapter 5)
- Suboptimal Control (Chapter 6)
- Infinite Horizon problems (Chapter 7 and selected Chapters from Volume 2)
- Simulation-based methods (Volume 2 and Neuro-Dynamic Programming by Bertsekas)

Course SLOs and Their Relationship to Program Outcomes

- Ability to formulate a variety of real world problems as sequential decision making problems and apply Dynamic Programming to solve them [1]
- Ability to use a variety of computational methods to solve stochastic shortest path problems [1]
- Ability to solve optimal control problems with perfect state measurements [1]
- Ability to reduce problems with imperfect state measurements to problems with perfect state measurements [1]
- Ability to approximately solve large scale problems using techniques such as aggregation and rolling horizon methods [1]
- Ability to formulate and solve infinite horizon problems
- Ability to use simulation based methods to solve optimal control problems
- Ability to use modern computational tools such as MATLAB for developing, simulating and testing solutions to optimal control problems [1].