

COURSE OUTLINE

IOE 512

Dynamic Programming

Winter Term 2004

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GSI: Stephen Baumert

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- Course Description: This is a course on the theory and practice of dynamic programming, i.e. optimal sequential decision making over time. The course will stress intuition, the mathematical foundations being for the most part elementary. Applications will be considered in capital investment, transportation, and production and inventory control. Prerequisites: IOE 510 and 316 or equiv.
- Text: Eric Denardo, Dynamic Programming: Models and Applications, Dover, May 2003.
- References: Stuart Dreyfus and Averill Law, The Art and Theory of Dynamic, Academic Press, New York, 1977.
- Sheldon Ross, Introduction to Stochastic Dynamic Programming, Academic Press, New York, 1983.
- Grading Policy:
- | | |
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| Exam 1 (Wed March 10) | 35% |
| Exam 2 (Wed April 21) | 35% |
| Homework | 30% |

IOE 512

Topic

Reading

Deterministic Dynamic Programming

Finite Decision Trees, Acyclic
Dynamic Programming Networks
and the Principle of Optimality

Chapter 1, class notes, and
handout

Shortest Path Algorithms

Chapters 2 and 4

Applications

Critical Path Method, Resource
Allocation, Knapsack Problems,
Production Control, Capacity
Expansion, and Equipment Replacement

Chapters 3 and 5

Infinite Decision Trees and Dynamic
Programming Networks with Cycles

Class notes

General Shortest Path Algorithms
including Label Setting and Correcting, A*,
and Solution Horizon Approaches

Chapter 2 and class notes

Applications

Infinite Horizon Optimization including
Equipment Replacement over an
Unbounded Horizon

Class notes

Stochastic Dynamic Programming

Stochastic Shortest Path Problems with
examples in Inventory Control

Class notes and Chapter 6

Markov Decision Processes with examples
in Asset Divestiture and Equipment
Replacement

Class notes and Chapter 8

COURSE POLICIES:

Homework:

Students are allowed to work in groups on homework. However each student is individually responsible for expressing their answers in their own terms. Also you may not acquire, read, or otherwise utilize answers from solutions handed out in previous terms. Homework is due at the

beginning of class one week after it is assigned. Late homework will not be accepted.

Exams:

a) Please note the exam times above. Valid excuses for failing to meet an exam are personal illness or illness in your immediate family. You must observe the Honor Code with respect to examinations and all other aspects of this course.

b) If you believe an exam question was graded in error and wish to have the exam regraded, you must submit the exam to the GSI together with a *written* explanation for requesting the regrade. This must be done within *one week* from the date the exam was returned. Be aware that an exam that is regraded may result in *all* of the graded problems being regraded so that you can lose or gain points by resubmitting.