Warehouse Operations

PhD Course, Bus 40902, Autumn 2006

University of Chicago
Graduate School of Business

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Overview: This course will focus on the economics or science of how to design, operate and manage a facility, such as a distribution center or warehouse. We will explore the academic literature that builds mathematical models that capture the detailed economics of the management of space and labor. In addition to various papers in the literature, we will use the manuscript in progress, “Warehouse & Distribution Science” by John J. Bartholdi, III and Steven T. Hackman, www.warehouse-science.com.

The course will also, when required, cover selected topics in combinatorial optimization.

Prerequisites: The course is for PhD students only. A background in optimization is helpful, but particular topics in combinatorial optimization will be covered in class.

Requirements: Weekly attendance and assignments. A more extensive written assignment will serve as a take home final exam.

Meeting Time/Place: The class will meet once per week in 3 hour sessions during the Autumn quarter (Sept 21 – Dec 9, 2006). If I get sufficient interest from NWU students I am willing to hold the course downtown, at our Gleacher Center. I also have some flexibility in the day/time. If you are interested in the course, let me know when you can attend ASAP. If you have any questions please feel free to contact me:
Email: don.eisenstein@chicagogsb.edu
Warehouse Operations

Preliminary Topics/Lectures/Papers

• Introduction: Warehouse Operations
  – Chapters 1–5, Warehouse Science, Bartholdi and Hackman
  – Material Flow, Operations, Storage and Handling.

• Storage optimization
  – Chapter 6, Warehouse Science, Bartholdi and Hackman
  – Chapter 7, Warehouse Science, Bartholdi and Hackman

• Design of fast pick area
  – Chapter 8, Warehouse Science, Bartholdi and Hackman

• Order picking design/optimization
  – Chapter 11, Warehouse Science, Bartholdi and Hackman
  – “Analysis and optimal design of discrete order picking technologies along a line” (Working Paper), by Eisenstein

• Cross-dock design
  – Chapter 12, Warehouse Science, Bartholdi and Hackman
  – “The best shape for a crossdock”, Transportation Science (2004), by Bartholdi and Gue

• High Density Storage Systems
  – “Very high density storage systems”, IIE Transactions (2006), by Gue

• Puzzle Based Storage Systems

• Facility Layout Problems

• Retrieval and Sorting
  – “Retrieval Strategies for a Carousel Conveyor”, IIE Transactions (1986), by Bartholdi and Platzman

• AGVs (Automated Guided Vehicles)
  

• Warehouse Aisle Design
  