

IE523
PRODUCTION SYSTEMS I

Fall 2009

INSTRUCTOR : **Dr. Ümit Bilge (M4025)**
SCHEDULE : **T 3-4 (M2231), Th 3 (M2180)**

OBJECTIVES:

As the first of a two-course graduate-level series on Production Systems, this course focuses on the design of production systems. A wide range of design problems encountered in modern manufacturing environments are covered with particular emphasis on advanced quantitative modeling and solution techniques. In addition to the fundamental work in the area, some very recent additions to basic problem definitions and newer approaches will also be addressed through paper discussions.

COURSE CONTENTS:

1. Introduction	1 class
2. Facility Layout	10 classes
3. Group technology and cellular production systems	8 classes
4. Flexible Manufacturing Systems	6 classes
5. Facility Location: Continuous and discrete space models	9 classes
6. Distribution and logistic systems	3 classes

TEXTBOOK: Heragu, S. Facilities Design, PWS Publishing Company, 1997.

READING MATERIAL:

Singh, N., and Rajamani D., Cellular Manufacturing Systems: Design, Planning And Control, Chapman and Hall,1996.

Askin R.G., and Stanridge, C.R., Modeling and Analysis of Manufacturing Systems, John Wiley and Sons, 1993.

Francis, R.L., McGinnis, L.F., and White, J.A., Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice Hall, 1992.

Groover, M.P., Automation, Production Systems, and Computer Integrated Manufacturing, Prentice Hall, 2001.

Singh, N., Computer-Integrated Design and Manufacturing, John Wiley and Sons, 1996.

GRADING:

Midterm : 25 % November 16, Monday 17:00
Final in-class : 20 %
Final assignment : 20%
Paper Presentation : 15 %
In-class discussions and attendance: 20%

IE523 Tentative Schedule			
Week	Date	Subject	Reading
1	29/9	Introduction	
		1 FACILITY LAYOUT	
	1/10	1.0 Basics for facility layout as prerequisite -Data requirements -Systematic layout planning -Basic algorithms and software	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.3 Heragu, Ch.4 Heragu, Ch.6
2	6/10	1.1. Models for the Layout Problem	Heragu , Ch.5
		1.1.1 Single Row Layout Problem	
	8/10	1.1.2 Multi-row Layout Problem	
3	13/10	1.2. Advanced Algorithms for the Layout Problem	Heragu, Ch.7
		1.2.1 Branch and Bound	
	15/10	1.2.2 Meta-heuristic algorithms	
4	20/10	1.2.3 Graph theoretic approaches	
	22/10	1.3. Next Generation Factory Layouts ^{1,2}	selected papers
5	27/10	2 CELLULAR MANUFACTURING SYSTEMS	
		2.0 Basics for GT as prerequisite -Defn.,Benefits, Classifications and coding, -Production flow analysis:ROC alg	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.8
		2.1 Cell formation using part machine matrix	Singh and Rajamani
6	3/11	2.2 Similarity coefficient based approaches	
	5/11	2.3 Mathematical programming methods	
		2.3.1 P-Median model	
		2.3.2 Assignment model	
7	10/11	2.3.3 Nonlinear model for simultaneous grouping	selected papers
		2.3.4 Multiple routings and capacity considerations ^{3,4}	
	12/11		
	16/11	Midterm	17:00
8	17/11	3 FLEXIBLE MANUFACTURING SYSTEMS	
		3.1 The concept of flexibility and FMS design problems - AGV flow path design ⁵	Groover,Ch.16 Singh, Ch. 13
	19/11	3.3 FMS Short-term design problems	selected papers
9	24/11	- FMS Loading Problem ^{6,7}	
	26/11	4 FACILITY LOCATION	
		4.0 Basics for facility location as prerequisite -Single facility discrete and continuous space problems	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.11
		4.1 Advanced Facility Location Models	Heragu, Ch.12
		4.1.1 Multi-Facility Location Models	
10	1/12	4.1.2 Location/Allocation Models	
		-Set covering problem	
		- n-Median problem	
	3/12	-Warehouse location problem	
11	8/12	-Capacitated L/A model ⁸	selected papers
	10/12		
12	15/12	5 DISTRIBUTION AND LOGISTICS SYSTEMS	selected papers
	17/12	paper presentations ^{9,10,11}	
13	22/12	paper presentations ¹²	