**IE523**
**DESIGN OF PRODUCTION SYSTEMS**

**Fall 2017**

**INSTRUCTOR : Dr. Ümit Bilge (M4025)**
**SCHEDULE : M 5-6 (M2171), Tue 3-4 (M1152)**

**OBJECTIVES:**
As the first of a two-course graduate–level series on Production Systems, this course focuses on the design of production systems; however can be seen as an *applied OR course*. 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.

**Requirements**: IE 202, IE 312 or equivalent (or, basic knowledge about Integer Programming and production systems)

**COURSE CONTENTS:**

1. Introduction — 1 class
2. Facility Layout — 10 classes
   *Advanced models and algorithms; Branch and Bound, Meta-heuristics, Graph theoretic approaches; Next generation factory layouts*
3. Group technology and cellular production systems — 8 classes
   *Production flow analysis; Similarity coefficient based approaches; Mathematical programming methods; multiple routings and capacity considerations*
4. Flexible Manufacturing Systems — 6 classes
   *The concept of flexibility; models for FMS design and short-term planning problems*
5. Facility Location, Distribution and Logistic systems — 12 classes
   *Continuous and discrete space location models; Location/allocation models; Capacitated, multi-echelon, multi-period models; Undesired facilities*

**TEXTBOOK:** Heragu, S. Facilities Design, Third edition, CRS, 2008.

**READING MATERIAL:** Along with several journal papers, some chapters from the following books will be used

- 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, 2008.
- Simchi-Levi, D., Xin C., and J. Bramel. The logic of logistics. Theory, Algorithms, and Applications for Logistics and Supply Chain Management, Springer-Verlag, 2014.
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**GRADING:**

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| Midterm | : 25 % |
| Final* | : 28 % |
| Paper Presentation | : 22 % |
| Assignments | : 20 % |
| In-class participation | : 5 % |

**Students who have taken the midterm, submitted <u>all</u> assignments and performed <u>all</u> assigned presentations can take the final exam.*