

0571.4117 - Facility Design

Fall Semester 2009

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Teaching Assistant:

Course objective and description

The student will learn advanced approaches for designing new facilities and improving existing facilities in manufacturing and service organizations. The course will presents qualitative and quantitative approaches for defining the appropriate production system, setting the proper workforce and equipment capacity, analyzing material flow, developing layout alternatives and selecting the preferred layout of manufacturing, service and storage areas.

Course topics:

1. Introduction: facility design – definitions, objectives, trends and considerations.
2. Stochastic and deterministic approaches for capacity planning.
3. Types of layout: product, process and cellular manufacturing based.
4. Facility layout: objectives, problem classification, systematic layout planning.
5. Material flow analysis.
6. Area requirement analysis.
7. Computerized algorithms for facility layout.
8. Mathematical formulations for facility layout.
9. Quadratic assignment problem – formulation and heuristic approaches.
10. Multi-objective optimization for the layout design.
11. Facility layout planning under uncertainty (robust design optimization).
12. Storage systems: introduction, storage methods, order picking.
13. Radio Frequency IDentification (RFID).

Grading structure:

Final exam – 75%

Project – 25%

Total - 100%

Remarks:

- Homework will be given on weekly basis but posting is not required. However, submitted homework will be examined and returned within a week.
- The project group will contain at most three students.
- The project will be posted Thursday, in the last week of the semester. Posting the project beforehand is possible in coordination with the instructor.

Course bibliography

- Francis R.L., McGinnis L.F. and J.A. White, "Facility layout and location: an analytical approach", Prentice-Hall, 1992.
- Tompkins J.A., J.A. White, Y.A. Bozer, J.M.A. Tanchoco, "Facility planning", Wiley, 3rd Ed., 2003.
- Heragu S., "Facility design", CRC Press Inc., 3rd Ed., 2008.