

IE 312
FACILITIES DESIGN AND PLANNING

Spring 2016

INSTRUCTOR : Dr. Ümit Bilge (M4025) (bilge@boun.edu.tr)

SCHEDULE : Monday 16:00-16:50 (M3100) – Problem Session
Tuesday 13:00-14:50 (M3120) – Regular Class
Thursday 13:00-14:50 (M3120) – Regular Class

DESCRIPTION :

As the first of a two-course series in Production Planning, this course is organized to introduce the students to modeling and analysis of production systems. After providing an understanding of the nature and context of production systems and the key decision areas at the various stages in a systems life cycle, the focus will be set on the strategic, long-range issues particularly related to the design phase. A wide range of design issues encountered in modern manufacturing environments will be addressed through various quantitative methods and modeling approaches. (4 Credits / 7 ECTS)

Prerequisite(s): IE 202 and IE 256

Course objectives (and program outcomes):

This course aims to provide students the skills and methods to solve a set of problems from various stages of (re)designing a production facility. By the completion of the course, the students will be able to;

- Discuss the major trade-offs between different production system types
- Use basic forecasting methods in order to develop capacity projections
- Calculate machine requirements for a desired production rate
- Conduct line balancing for an assembly line
- Design production cells using clustering approaches based on process similarities
- Formulate and solve facility location problems
- Formulate and solve facility layout problems

Considering these objectives, this course mainly addresses the following student outcomes of the industrial engineering undergraduate program;

- *Student Outcome (c):* An ability to design diverse systems including manufacturing, service, logistics, financial and information, to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- *Student Outcome (e):* An ability to identify, model, formulate and solve industrial engineering problems
- *Student Outcome (k):* An ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice.
- *Student Outcome (d):* An ability to function in (multi-disciplinary) teams

COURSE CONTENTS:

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| 1. Production systems: Nature, classification and hierarchical decision framework | 3 classes |
| 2. Product design and concurrent engineering | 4 classes |
| 3. Forecasting systems | 9 classes |
| 4. Long-range capacity planning | 4 classes |
| 5. Design of process based production systems | 5 classes |
| 6. Design of serial production systems | 4 classes |
| 7. Design of cellular production systems | 4 classes |
| 8. Design of storage systems | 5 classes |
| 9. Design of material handling systems | 2 classes |
| 10. Facility location | 6 classes |

TEXTBOOK AND/OR OTHER MATERIAL:

A compilation of lecture notes will be available for the participants at the beginning of the semester. Additionally, the following books are reserved at the library for this course. Although none of them covers all the course topics, you may find them useful at certain sections of the course as supporting textbooks.

- Askin R.G., and Stanridge, C.R., Modeling and Analysis of Manufacturing Systems, John Wiley and Sons, 1993.
- Elsayed, E.A., and Boucher, T.O., Analysis and Control of Production Systems, Prentice Hall, 1994.
- Francis, R.L., McGinnis, L.F., and White, J.A., Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice Hall, 1992.
- Heragu, S. Facilities Design, Third edition, CRS, 2008.

CASE ASSIGNMENT ON FACILITY DESIGN: Students will form teams of THREE members to work on a facility design assignment for about 3 weeks. Teams are expected to analyze a given case, come up with a good layout design for it and to present their work in a project report. A computerized layout planning software which is available in UnderGraduate Computer Lab of IE department will be used during this project.

GRADING:

Midterm I	: 25%
Midterm II	: 25%
Final*	: 32%
Case Assignment	: 18%

***ELIGIBILITY FOR THE FINAL EXAM:** You will have the right to take the final exam only if you fulfill the following conditions:

1. Submitted the report for the case assignment in due time
2. Have a midterm average $((\text{Midterm 1 Grade} + \text{Midterm Grade 2})/2)$ strictly higher than 25

If you miss an midterm exam (only due to severe health condition) then you must provide an official health report on the same day or the next day.