Course Description

The course introduces the student to manufacturing systems and covers a broad spectrum of tools and issues of design and operation as related to manufacturing systems. Typically, we will discuss a given manufacturing setting, point out relevant issues and problems, present analytical models in order to propose a solution to the problem at hand, and finally introduce the mathematical solution methodology as needed.

We will supplement the textbook with articles from various academic journals. All students are expected to read these articles before coming to class and contribute to the discussion. Generally, papers will be presented by student groups.

Course Outline

This is a tentative outline. Additions/subtractions may occur as the semester progresses.

1. Introduction.
   (a) Manufacturing system types and principles.
   (b) Manufacturing models.

2. Assembly Lines.
   (a) Introduction and problem formulation.
   (b) Approaches to assembly line balancing.

   (a) Introduction.
   (b) Analysis of paced and unpaced lines.

(a) Introduction and system components.
(b) FMS system design models.

5. Group Technology.
   (a) Introduction and part coding schemes.
   (b) Models for cell formation.

   (a) Preliminaries of scheduling theory.
   (b) Single machine models.
   (c) Parallel machine models.
   (d) Flow- and job shop models.

   (a) Introduction to performance evaluation in manufacturing systems.
   (b) Effect of variability on system performance.

Grading

1. Homeworks. Solutions will be provided, but homeworks will not be graded. Note that you still have to turn in your homeworks.
2. Three pop-up quizzes (10%). The worst grade will be dropped. The quizzes will be closely related to the homework questions.
3. Paper presentations and class discussions (10-15% depending on the number of presentations per student/team).
4. Midterm (20%).
5. Final (30-35%).
6. Project (25%).

Software

Information and support for all academic software provided by the university can be found at:

http://www2.sabanciuniv.edu/bt/servisler/akademik_destek/yazilim_lisansli/tum_yazilimlar.html

1. Some homework problems and your term project may require formulating an integer or linear programming model and actually solving it with mathematical programming software. You are free to use any software that you like (GAMS, AMPL, LINDO, OPL Studio, etc.), but I will only use AMPL or OPL Studio in my solutions. It is your responsibility to learn how to use these software.

A trial version of LINDO/LINGO is available from the web site of the vendor (see below), and full versions of GAMS, AMPL and OPL Studio can be downloaded from the software server of the university:

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\software\academic\ILOG
ILOG is the vendor for both AMPL and OPL Studio. For these ILOG products, you must also install the ILOG license manager, and the license file which you can find under the course web page on WebCT. For installing AMPL and the license manager, use the install.exe file under the path specified above. In order to install OPL Studio 4.2, go to the directory
\software\academic\ILOG\OPLST_v4.2
A detailed set of instructions for installing the ILOG products is provided on WebCT along with a tutorial on AMPL and some documentation related to GAMS. Documentation for ILOG products is installed automatically.
For further information on these software products:

www.ilog.com/products
www.ampl.com
www.gams.com
www.lindo.com

2. Some homework problems and your term project may involve coding an algorithm in a general purpose language, e.g., Visual Basic, C, C++, Java, etc.

3. If we cover “performance evaluation in manufacturing systems and effect of variability on system performance”, then we may use simulation software to illustrate the basic ideas. More information will be provided if necessary.

Textbook


References

Scheduling : theory, algorithms, and systems, 2nd ed. Michael Pinedo. Prentice Hall, 2002. (This book will be put on reserve in the Information Center when we start covering “operations scheduling.” Note that there is also a 1995 edition of this book in the Information Center.)