

IE 548

**Stochastic Models of
Manufacturing Systems**

Spring 2009

Instructor: Aybek Korugan (aybek.korugan@boun.edu.tr)

Goals: In this course first a general review of product form and non-product form queueing networks will be given. General applications in several systems will be discussed. Then production systems will be modeled as stochastic queueing networks with finite buffers. Analysis methods of these networks will be discussed. Finally common control mechanisms for these systems will be introduced.

Topics:

1. Introduction
2. Queues and Queueing Networks
3. Markov Models of Machines with Failure Rates
4. Transfer Lines
5. Decomposition of Long Transfer Lines
6. Aggregation and Expansion Methods
7. Assembly/Disassembly Systems
8. Control of Production Systems (Pull and Push Systems)

References and Reading Material:

- Manufacturing Systems Engineering, Stanley B. Gershwin, 2002 (gershwin@mit.edu, <http://web.mit.edu/manuf-sys/www>)
- Stochastic models of manufacturing systems / John A. Buzacott, J. George Shanthikumar, 1993.
- Production Systems Engineering , Jingshang Li and Semyon Meerkov, 2008.
- Factory Physics, Wallace J. Hopp and Mark L. Spearman, 2001.
- Journal papers on the subject will be assigned as additional reading material.

Prerequisites: A good knowledge of stochastic processes is a must for the course. Therefore a successfully completed IE304 or IE505 (or an accepted equivalent) is the prerequisite of this course.

Course Website: <http://karagoz.ie.boun.edu.tr/moodle/> (Enrolment Key. TBA)

Course Hours and Rooms:

Monday 14.00 to 15.00 (M2231)

Friday 13.00 to 15.00 (M2170)

Quizzes: Quizzes will be given on assigned reading material.

Grading: Final exam (30 %), final project (40%), quizzes (20%), attendance (%10)

Attendance Rule: Attendance will be taken randomly and evaluated as a piecewise-continuous function

$$f(x) = \begin{cases} x, & \text{for } 0.7 \leq x \leq 1 \\ x/2, & \text{for } 0.3 \leq x < 0.7 . \\ 0, & \text{for } x < 0.3 \end{cases}$$

Office Hours: Aybek Korugan: Tuesday 11:00-13:00, Thursday 15:00-18:00