

IE 548

**Stochastic Models of
Manufacturing Systems**

Spring 2017

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

Course Description: The objective of the course is to discuss the impact of uncertainty in production systems and present queueing network models as tools of analysis. To this end, first a general review of product form and non-product form queueing networks is given. General applications in several systems are discussed. Then production systems are modeled as stochastic queueing networks with finite buffers. Analysis methods and performance measures for these networks are introduced. Then control methods for production systems are discussed.

Topics:

1. Introduction
2. Queues and Queueing Networks
3. Exact and Approximate Analysis of General Queueing Networks
4. Markov Models of Machines with Failure Rates
5. Networks with Machine Failures: An Overview of Methods: Aggregation, Expansion, Decomposition
6. Transfer Lines : General Properties
7. Decomposition Method: Two Machine One Buffer Line
8. Decomposition of Long Transfer Lines
9. Control of Production Systems
10. Extensions and New Models

References and Reading Material:

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

Prerequisites: A good knowledge of stochastic processes is a must for the course. Therefore a successfully completed IE450 or IE505 (or an accepted equivalent) is the prerequisite of this course.

Course Website: <http://moodle.ie.boun.edu.tr/course/view.php?id=23>
(Enrolment Key: TBA)

Course Hours and Rooms: Friday 11:00-14:00, M1152,

Grading: Final exam (30 %), final project (30%), midterm (30%), attendance and class participation (%10)

Students must submit their projects. Not submitting the project results in an automatic F for course grade.

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: TBA