

ISyE 6405 "Statistical Methods for Manufacturing Design/Improvement", Fall 2008

Lecture Time: (tentative) MW 3:00-4:30pm, **Room Number:** TBD

Instructor: Jan Shi, jshi33@isye.gatech.edu, Phone: 404-385-3488, Office: 214 (main building)

Office hours: TBD, or by appointment

Web site: <http://www2.isye.gatech.edu/~jshi33/courses/>

Required Textbook: NONE (course pack/handout will be posted on the web)

Reference/Review:

On statistical process control : D. C. Montgomery (2003). *Introduction to Statistical Quality Control (5 rd Edition)*. New York City : John Wily and Sons.

On multivariate monitoring: R. A. Johnson, R. A., and D. W. Wichern (2001). *Applied Multivariate Statistical Analysis (5 th Edition)* , Upper Saddle River , NJ : Prentice Hall.

On Stream of Variation: Jianjun Shi, “*Stream of Variation Modeling and Analysis for Multistage Manufacturing Processes*”, ISBN: 0-8493-2151-4, CRC Press, 2006. 469pp.

Description: This course covers statistical methods and its applications in design and improvement of manufacturing systems. The focus will be given to variation reduction in various complex systems. Specifically, it focuses on three topics: (1) advanced control charts, (2) multivariate statistics, data dimension reduction and interpretation, (3) stream of variation methodology and implementations. Some special topics, such as multivariate monitoring and analysis, variation pattern recognition, integration of statistical process control and automatic process control, and multistage system modeling and analysis are presented. The goal is for you to understand the concepts, operation, applications, and role of these techniques. Methods discussed will find themselves in a broad spectrum of applications, including manufacturing system, health care delivery, financial data, as well as service industry.

Course Topics

- Overview of variation reduction and in-process quality improvement activities
- Review of basic statistics and Statistical Process Control
- Multivariate statistics and multivariate SPC (T2, multivariate CUSUM and EWMA)
- Time series modeling and control charts for autocorrelated data
- Integration of SPC and APC
- Principle component analysis (PCA) and PCA-based control charts
- Variation modeling, analysis and control
- Introduction of Stream of Variation theory and applications
- Applications (QC, dimension reduction, manufacturing systems, healthcare, service industry)

Preferred Background

- Linear Algebra or Matrix Algebra
- Knowledge on hypothesis test, likelihood function, and linear regression

GRADING: Homework (as assigned)	30%
Exam	35%
Term Project	35%