Recent Advances in Multivariate Control Charts
Chair: David Matthews (University of Waterloo)
Organizer: Shojaeddin Chenouri (University of Waterloo)

SHOJA'EDDIN CHENOURI, University of Waterloo
Depth Based Multivariate Nonparametric Control Charts

In this talk, we discuss several control charts for monitoring multivariate processes. These control charts are based on the concept of data depth. We begin with reviewing control charts introduced in Liu (1995). We further construct several new depth based multivariate control charts. Unlike the commonly used multivariate control charts, the charts discussed in this talk are all distribution free, and do not need the assumption of the multivariate normality.

ASOKAN VARIYATH, Memorial University of Newfoundland
Robust Multivariate Control Charts for Monitoring Process Mean and Covariance Matrix

To monitor a multivariate process, a classical Hotelling’s T2 chart is often used. Since sample mean and sample covariance matrix are sensitive to outliers, classical T2 charts are not effective when Phase I data contains outliers. We propose robust Hotelling’s T2 type control charts for monitoring multivariate individual observations based on the highly robust and efficient estimates of mean and covariance matrix. Our Monte Carlo simulation studies are in favor of re-weighted MCD based T2 charts irrespective of sample size, dimensionality and outlier patterns of Phase I data. We also propose multivariate robust control charts for monitoring the covariance matrix.

ROMAN VIVEROS-AGUILERA, McMaster University
Monitoring Profiles

Dimensions, surface texture and geometric specifications are all important features of products. Thus keeping an eye on these characteristics as items are manufactured can be a useful effort to identify and correct deviations from course in the manufacturing process. Profile data typically consist of the coordinates of hundreds of points along the edge of the product. The main feature is high short-term correlation and circularity. Smoothing followed by analysis of scores from the leading principal components of smoothed values lead to our proposed multivariate Shewhart and multivariate exponentially weighted moving average charts. Numerical evidence, comparisons and illustrations are presented.