

# Statistical Techniques for Monitoring Industrial Processes



*Lecture* : PCA – Fault Detection Implementation

*Module* : PCA-based MSPM

# Course TOC

❑ Introduction to Statistical Process Monitoring (SPM)

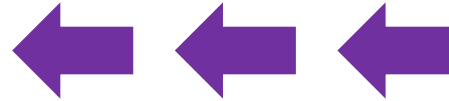
❑ Python Installation and basics (optional)

❑ Univariate SPM & Control Charts

- Shewhart Charts
- CUSUM Charts
- EWMA Charts

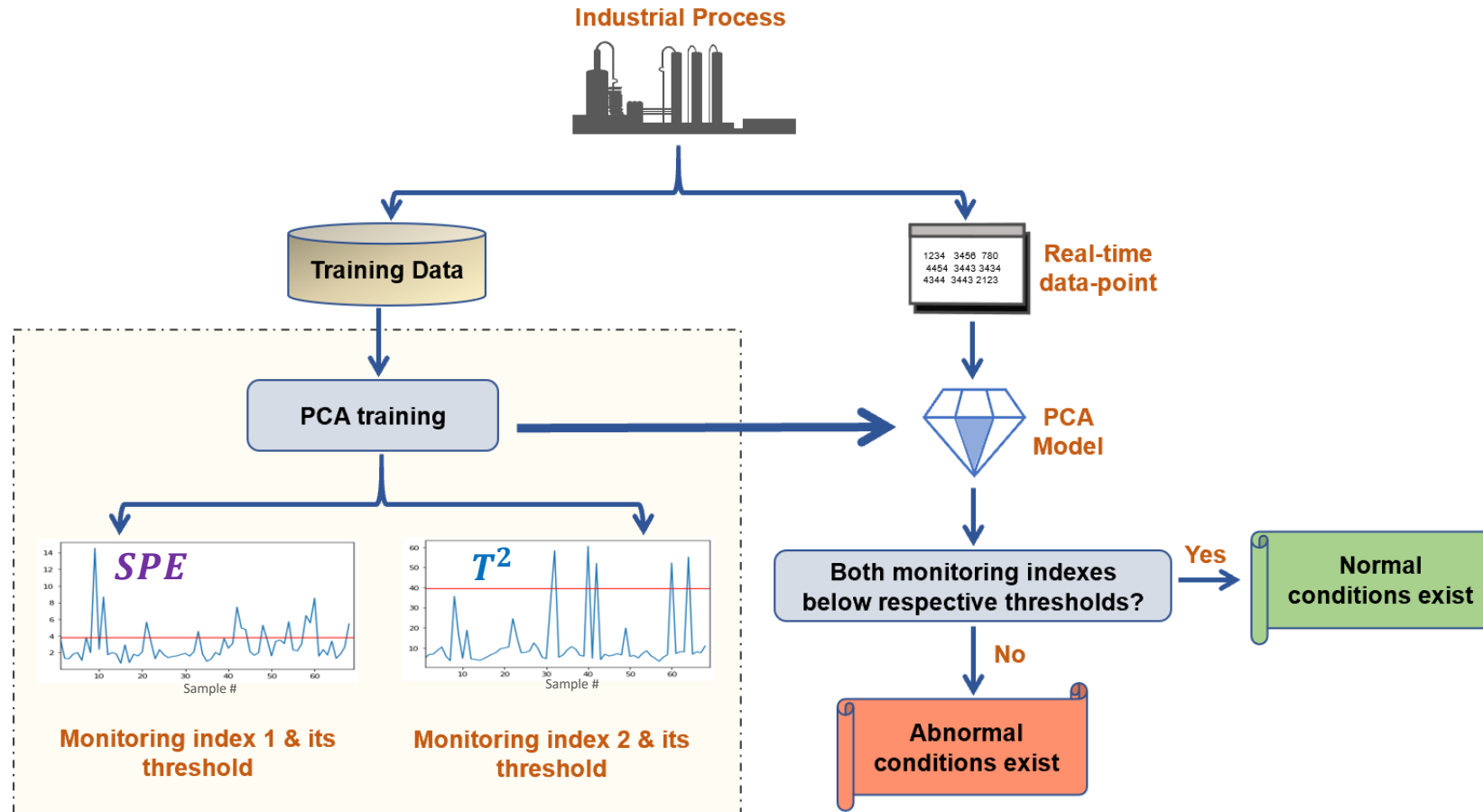
❑ Multivariate SPM

- Principal Component Analysis (PCA)-based MSPM
  - Dimensionality reduction
  - Fault detection & diagnosis (FDD) using PCA
  - Application to a Polymer Manufacturing process
- Partial Least Squares (PLS) regression-based MSPM
- Strategies for handling nonlinear, dynamic, multimode systems



❑ Deploying SPM solutions

# PCA-based Fault Detection Workflow





# Statistical Techniques for Monitoring Industrial Processes



*Next Lecture* : PCA – Fault Diagnosis

*Module* : PCA-based MSPM

