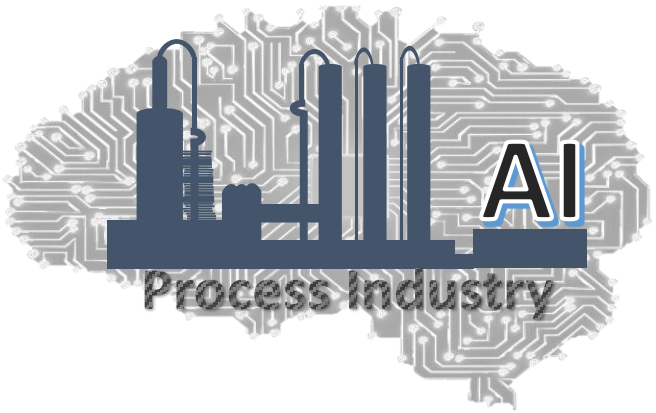
Statistical Techniques for Monitoring Industrial Processes



Lecture : Course Syllabus & Logistics

Module : Course Introduction

Course Syllabus

- ❑ Introduction to Statistical Process Monitoring (SPM)
- ❑ Python Installation and basics (optional)
- ❑ Univariate SPM
  - ➢ **Shewhart Charts**
  - ➢ **CUSUM Charts**
  - ➢ **EWMA Charts**
- ❑ Multivariate SPM
  - ➢ Fault detection using **Principal Component Analysis** (PCA)
  - ➢ Fault detection using **Partial Least Squares** (PLS) regression
  - ➢ Fault diagnosis using PCA/PLS contribution charts
  - ➢ Strategies for handling nonlinear, dynamic, multimode systems
- ❑ Deployment of SPM Solutions

Mainstream techniques suitable for majority of industrial process systems

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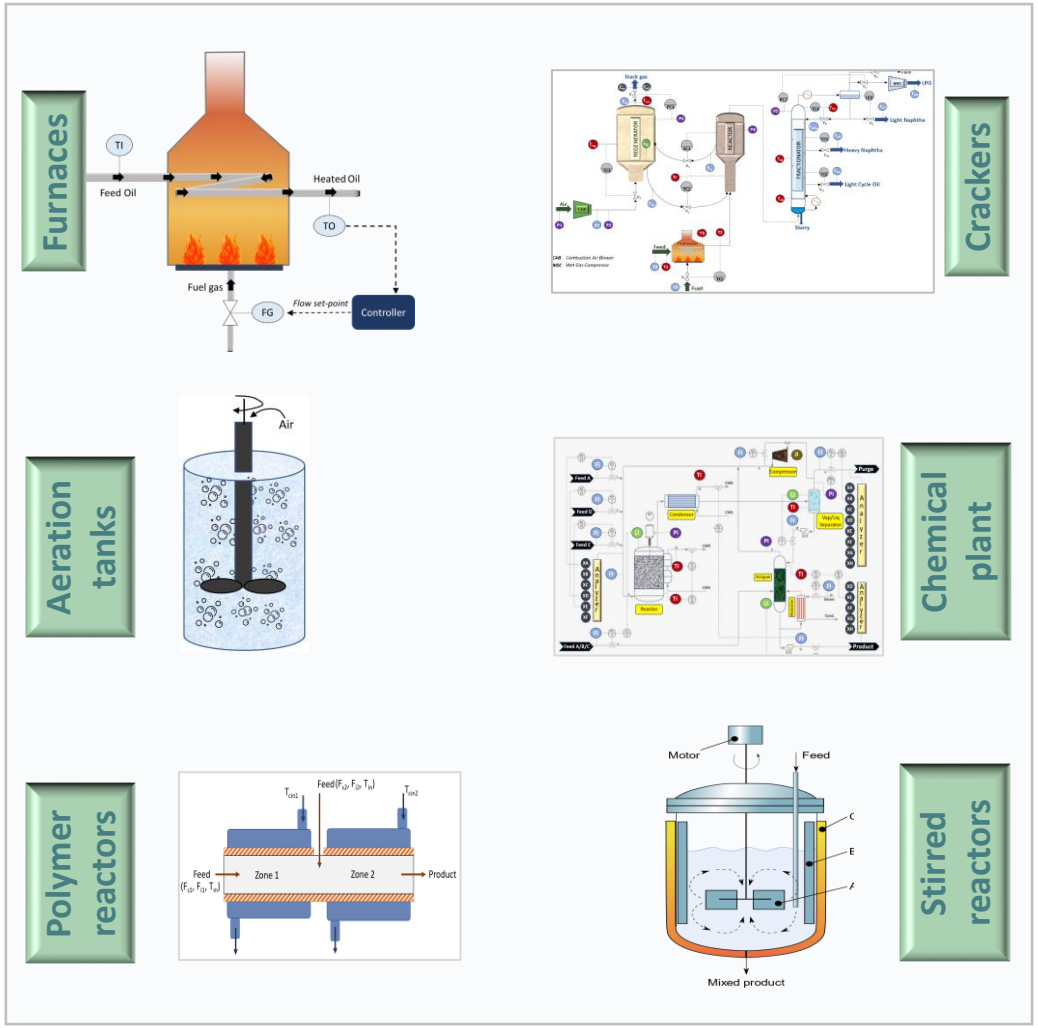
Process Industry-relevant case Studies



* Stirred reactor diagram: created by Daniele Pugliesi under Creative Commons Attribution-Share Alike 3.0, https://commons.wikimedia.org/wiki/File:Agitated_vessel.svg
Chemical plant diagram: adapted from the original flowsheet by Gilberto Xavier (https://github.com/gmxavier/TEP-meets-LSTM) provided under Creative-Commons Attribution 4.0 International License

Course Objectives

- ❑ Introduction to Statistical Process Monitoring (SPM)
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Process Industry-relevant case Studies

Provide conceptual understanding and implementation details of the mainstream SPM techniques to enable you to build process monitoring solutions confidently

After completing this course, you will be able to

- ➢ **build monitoring tools for univariate and multivariate systems**
- ➢ **develop fault diagnosis solutions to automatically find the troublesome signals in complex processes**
- ➢ **understand the pros and cons of different techniques**

Prerequisites

- No prior Python programming experience needed
- No prior machine learning experience required

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Next Lecture : Introduction to SPM

Module : Course Introduction