

# **ENGINEERING DESIGN, MANUFACTURING, AND MANAGEMENT SYSTEMS**

## **COURSE SYLLABUS EDMM 6810 Process Monitoring & Control**

The study of process improvement techniques that will ultimately leads to quality products. Process improvement includes the reduction of variability in process during the manufacturing stage resulting in improved product quality. A team problem solving approach utilizing data acquisition systems and statistical methods are emphasized. Practical industrial applications of process monitoring and control are reviewed.

Prerequisites: STAT 2600, IEE 2610 or equivalent

Text: None required (References held at Waldo Library)

Objectives: Upon completion of this course the student will be able to:

1. Understand the basic nature of industrial processes.
  - Differentiate between a process and a system.
  - Identify the appropriate industrial processing philosophy.
  - Analyze processing parameters that contribute to the make-up process problems.
2. Understand industrial process control systems.
  - Survey appropriate industrial process control equipment for mechanical, thermal, electrical, and chemical systems.
3. Understand process testing techniques.
  - Analyze industrial processes and establish appropriate testing techniques to solve process related problems.
4. Understand of the role of process monitoring in the manufacturing environment.
5. Understand the role and function of teams in the problem solving process.
6. Identify special and common causes of process variability.
7. Develop an ability to use basic data gathering and analysis tools.
8. Understand of the concepts of data distributions in process control.
9. Identify appropriate control charts to assess the state of a process.
10. Develop abilities in the construction and interpretation of control charts.
11. Understand the relationship between process control and process capability.

12. Understand for the fundamentals of Lean/6 $\sigma$  programs.

**Course Outline:**

- I. Introduction
  - A. Instructor and participants
  - B. Course objectives and outline
  - C. Interrelationship among manufacturing, engineering, & process monitoring.
  - D. Problem solving model
- II. Foundations of Process Monitoring and Control
  - A. Process
  - B. System
  - C. Variation
  - D. Prevent versus Detection Systems
- III. Process Variability
  - A. Definition of
  - B. Types of
  - C. Causes of
- IV. Process Parameters
  - A. Definition of
  - B. Testing techniques
  - C. Testing equipment
- V. Data Gathering and Basic Analysis Tools
  - A. Data Acquisition Systems
  - B. Sampling Techniques
  - C. Measures of Variability
- VI. Interpretations of Data Distributions
  - A. Shape of Distributions
  - B. Application of Statistical Tools
  - C. Predictive Capabilities
- VII. Implementation of Control Charts
  - A. Purpose of Charting
  - B. Elements to be Charted
  - C. Sampling Techniques
  - D. Frequency of Sample
  - E. Charting Techniques
  - F. Out of Control Conditions
- VIII. Calculating and Interpreting Process Capability
- IX. Fundamentals of Lean/6 $\sigma$

- Week 1 Introduction and Organization
- Week 2 Process versus System
- Week 3 Data Gathering Strategies
- Week 4 Problem Solving

Week 5	Process Variability (types/causes)
Week 6	Analysis Tools
Week 7	Charting & Monitoring Techniques
Week 8	<b><u>EXAM 1 (Mid Term)</u></b>
Week 9	Eliminating Waste for System Improvement
Week 10	MEGA Trends for System Improvement
Week 11	Process Capability
Week 12	Lean & 6σ Fundamentals
Week 13	<b><u>EXAM 2(Final)</u></b>

**Evaluation:**

1. Course Work (8 * 5% each)	40%
2. Midterm Exam	30%
3. Final Exam	30%
4. Attendance	<u>05%</u>
	<b><u>105%</u></b>

**Grading Criteria:**

90-100 = A	80-84.9 = B	70-74.9 = C	60-64.9 = D
85-89.9 = BA	75-79.9 = CB	65-69.9 = DC	<60 = E