Miami Dade College

Course Description

ETI1622 | Concepts of Lean and Six Sigma | 3.00 credits

This course is designed for students who are preparing for careers in the manufacturing industry. Students will learn the basic concepts, frameworks, and techniques used in six sigma, including total quality philosophies, the calculation of six sigma and other vital statistics, tools of lean six sigma, and knowledge of various methodologies.

Course Competencies

Competency 1: The student will be able to demonstrate an understanding of total quality philosophies and frameworks used in organizations by:

1. Defining the meaning of quality
2. Discussing the history of quality and its importance to organizations
3. Listing and comparing various quality philosophies including Deming, Juran, and Crosby
4. Explaining the difference between the U.S. Malcolm Baldrige National Quality Award and the International ISO 9000 certification process
5. Discussing various perspectives from which quality is viewed, including judgmental, product- based, user-based, value-based, and manufacturing- based and explaining when to integrate the perspectives to ensure the highest level of quality
6. Reading case studies that highlight organizations that implement quality standards and observing the many ways in which quality can be viewed
7. Discussing the Corporate Responsibility Process (CRP) and how it relates to ethics and morals

Competency 2: The student will be able to define and calculate six sigma by:

1. Determining which factors should be considered when choosing a six sigma project
2. Calculating the defects per unit (DPU) and the defects per million opportunities (DPMO)
3. Preparing a written report or presentation that explains the theoretical basis for six sigma
4. Calculating six sigma and its tolerance limits

Competency 3: The student will be able to identify and utilize the tools of lean six sigma by:

1. Defining the 5S's (sort, set in order, shine, standardize, and sustain)
2. Summarizing and discussing key tools used in lean production including:
    a) the 5S's
    b) visual controls
    c) efficient layout and standardized work
    d) pull production
    e) Single Minute Exchange of Dies (SMED)
    f) total productive maintenance
    g) source inspection
    h) continuous improvement
3. Analyzing business cases to identify where and how key tools can be used in order to improve the production process

Competency 4: The student will be able to define and apply six sigma methodologies by:

1. Analyzing case studies and applying the DMAIC (Define, Measure, Analyze, Improve, Control) Methodology to find the root cause of the problem and improve quality
2. Applying the DFSS (Design for Six Sigma) and DFLSS (Design for Lean Six Sigma) Methodology to processes in order to make them more efficient
3. Using the voice of the customer (VOC) to create a design of experiments (DOE)

4. Creating a product or process using the DMADV (Define, Measure, Analyze, Design, Verify) Methodology
5. Discussing the benefits of each methodology and deciding which to use in order to solve problems

Competency 5: The student will apply various quality improvement tools to solve quality problems by:

1. Analyzing problems to determine the root cause using recommended statistical tools and processes provided by total quality initiatives
2. Identifying problems, determining their root causes using a 'Fishbone Analysis', and implementing countermeasures
3. Creating corrective action and preventive action plans (CAPA)
4. Monitoring processes using total quality tools in order to reduce defects
5. Identifying and explaining how to implement critical-to-quality (CTQ) measures given in case studies
6. Comparing process measurements to industry standards
7. Observing and documenting measurements using quality control charts
8. Listing several quality improvement tools and explaining their reason for use and capabilities

Competency 6: The student will be able to calculate and analyze statistics using variables and formulas by:

1. Collecting, calculating, and defining sample data in relation to the population
2. Calculating tolerance
3. Calculating random variables and probability distributions
4. Creating, comparing, contrasting and graphing data plots and distributions
5. Applying statistical tools to test for statistically significant change using variables and/or proportional data
6. Creating, calculating, and comparing regression and correlation models
7. Computing analysis of variance (ANOVA) statistics
8. Drawing conclusions about equality of means of multiple populations

Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information