

# COURSE OUTLINE

**TELE-200**  
**Quality Control**  
**3 Semester Hours**

## HOWARD COMMUNITY COLLEGE

### Description

This course is designed for the student in the Photonics Technology program. The course introduces the student to (a) the principles, philosophies, and practices of Total Quality Management (TQM) and (b) the techniques of Statistical Quality Control, including fundamentals of probability and statistics, control charts for variables and attributes, and acceptance sampling. Prerequisite: MATH-070. (3 hours weekly)

### Overall Course Objectives

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

1. Discuss the principles and practices of Total Quality Management (TQM).
2. Explain customer focus, continuous improvement, total employee involvement and process improvement.
3. Explain the philosophies of quality “gurus”, such as Deming, Juran, Crosby, Taguchi, and Ishikawa.
4. Construct a histogram, explain its significance, and analyze its characteristics.
5. Explain the concepts of population and sample.
6. Design sampling experiments for quality determination of a product.
7. Construct a Pareto diagram on the basis of a given set of data.
8. Construct a scatter diagram from a given set of data, and determine the type of correlation using direct and indirect observations.
9. Explain the difference between accuracy and precision in data collection.
10. Discuss the principles of probability and statistics, and use them as tools in quality control.
11. Take data, plot a frequency distribution curve, and determine the measures of central tendency, dispersion, skewness, and kurtosis.
12. Construct the normal distribution curve, and conduct a thorough analysis of its characteristics (mean, standard deviation, etc.).
13. Discuss the Central Limit Theorem, and use it in real world samples.
14. Use  $\bar{x}$  and R Control Charts to achieve optimal quality improvement of a process.
15. Explain the difference between continuous process and batch process, and describe the advantages and disadvantages of each.
16. Discuss the fundamentals and the basic theorems of probability, and apply various probability distributions (binomial, Poisson, etc.).
17. Construct various types of Attribute Control Charts, and analyze their characteristics.
18. Design a sampling plan for lot-by-lot acceptance.

### Major Topics

1. **Total Quality Management - Introduction and Overview**
  - (a) History and Evolution of Quality Control and Management
  - (b) Quality - Definition and Measurement
  - (c) TQM - Leadership, Customer Satisfaction, Employee Involvement, Continuous Process Improvement, Supplier Partnership
  - (d) Philosophies of Quality Gurus

2. **Fundamentals of Statistics**
  - (a) Frequency Distribution
  - (b) Measures of Central Tendency and Dispersion
  - (c) Population and Sample
  - (d) The Normal Curve
3. **Fundamentals of Probability**
  - (a) Basic Concepts in Probability
  - (b) Discrete Probability Distributions
  - (c) Continuous Probability Distributions
4. **Tools of Quality - Old and New**
  - (a) Old Tools including Histogram, Cause and Effect Diagrams, Pareto Diagram, etc.
  - (b) New Tools including Matrix Diagram, Affinity Diagrams, etc.
5. **Total Quality Management - Introduction to Popular Quality Tools and Techniques**
  - (a) Introduction to Statistical Process Control and Acceptance Sampling
  - (b) Failure Mode and Effect Analysis
  - (c) Total Productive Maintenance
  - (d) Concurrent Engineering
  - (e) Design of Experiments
  - (f) House of Quality
  - (g) Benchmarking
6. **Control Charts for Variables**
  - (a) Control Chart Techniques - X-bar, R and s Charts
  - (b) State of Control
  - (c) Process Capability
  - (d) Computer Examples and Practical Applications
7. **Additional SPC Techniques for Variables**
  - (a) Continuous and Batch Processes
  - (b) Short-Run SPC
  - (c) Gage Control
8. **Control Charts for Attributes**
  - (a) Control Charts for Nonconforming Units - p and np Charts
  - (b) Control Charts for Count of Nonconformities - c and u Charts
  - (c) A Quality Rating System and Computer Applications
9. **Lot-by-Lot Acceptance Sampling by Attributes**
  - (a) Fundamental Concepts
  - (b) Statistical Aspects
  - (c) Sampling Plan Design
10. **Acceptance Sampling Systems**
  - (a) Lot-by-Lot Acceptance Sampling Plans by Attributes
  - (b) Acceptance Sampling Plans for Continuous Production
  - (c) Acceptance Sampling Plans for Variables
11. **Reliability**
  - (a) Fundamental Aspects
  - (b) Additional Statistical Aspects
  - (c) Life and Reliability Testing Plans

### **Course Requirements**

**Grading/exams:** Grading procedures will be determined by the individual faculty member, but will be based on classroom exercises, homework assignments, quizzes, unit tests, and final exam.

**Writing:** Specific writing assignments will be determined by the individual faculty member.

### **Other Course Information**

This course is required in the Photonics Technology Program.