NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ECONOMICS AND STATISTICAL ENGINEERING
STATISTICAL ENGINEERING PROGRAM

ES714 – QUALITY STATISTICAL CONTROL I

I. GENERAL INFORMATION

CODE	**:**	ES714 Quality Statistical Control I
SEMESTER	**:**	7
CREDITS	**:**	3
HOURS PER WEEK	**:**	5 (Theory – Practice)
PREREQUISITES	**:**	ES611 Sampling II
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

This course trains students in the design and development of quality control systems of an enterprise; the execution of the quality control for materials and goods acquired or produced, as well as quality control for manufacturing processes throughout the production line. Concepts are reinforced using practical examples and preparing and application paper that encompasses all the learning units of the course. Application problems about control charts and sampling plans.

III. COURSE OUTCOMES

1. Identify quality as business responsibility and as market competitiveness factor.
2. Apply quality control principles and statistical methods in order to control and improve quality.
3. Develop and apply the statistical control of the process and determine its flair to generate products that meet quality specifications.
4. Develop and apply acceptance sampling plans for statistical quality control in material and input lots, as well as finished products.

IV. LEARNING UNITS

1. CONCEPT OF QUALITY / 4 HOURS

Introduction to the course / Nature, importance / Customer focus. Process. Problems. Basic definitions. Degree of quality / Background of quality. Evolution. Eras / Quality elements. Planning. Control. Improvement. Reliability. Maximum quality.

2. QUALITY CONTROL / 12 HOURS

Quality function / Characteristics of quality / Variables / Technical specifications / Institutional framework. Quality problems in the domestic industry / Standardization / Metrology / Certification. Accreditation. Quality assurance / Quality system. Product requirements / Types of quality / Inspection: ways, phases, methods, nature and degree. Inspection criteria / Sampling / Classification of quality control costs / Sampling inspection. Total inspection. Receipt inspection / Supplier certification.

3. CONTROL CHARTS / 8 HOURS

Principles of statistical control / Causes of variation in quality / Types of data. Control charts / Classification / Variable control charts. Classification. Elaboration. Interpretation. Applications.

4. PROCESS CAPABILITY / 4 HOURS

Control chart for the process mean, range, and standard deviation / Process capability. Process focus. Analysis and interpretation. Applications.

5. CONTROL CHARTS FOR ATTRIBUTES / 8 HOURS
Concept. Classification. Control chart for fraction defective / np-chart / Elaboration. Interpretation. Application. Control charts for number of defects / U-chart / C-chart / Elaboration. Interpretation. Applications.

6. ACCEPTANCE SAMPLING PLANS / 16 HOURS
Acceptance sampling plans / Conceptual basis / Operating Characteristic Curve (OC-Curve) / Classification / Characteristics. Applications. Acceptance sampling by attributes / Single, double and multiple sampling plans. Producer's risk. Consumer's risk. Applications. Sampling plans with chart application for Military Standard 105D (ANSI/ASQC Z1.4) / Dodge-Roming Sampling Plans / Acceptance sampling by variables / Military Standard STD 414 (ANSI/ASQC Z1.9).

7. QUALITY IMPROVEMENT (I) / 8 HOURS
Statistical methods fort quality control / Standard deviation and mean / Data sheet. Check sheet. Pareto chart / Ishikawa Diagram / Stratification / Correlation.

V. LABORATORIES AND PRACTICAL EXPERIENCES
Quiz 1: Identification of quality cost.
Quiz 2: Statistical quality control.
Quiz 3: Control charts.
Quiz 4: Statistical tools for quality improvement.

VI. METHODOLOGY
This course will be using motivation, exposition, group debate, explanation, demonstration, and team work formation for exemplification, analysis and interpretation. At the end of the course, students must hand in and expose a research paper. In all sessions, students' active participation is encouraged.

VII. EVALUATION FORMULA
The average grade PF is calculated as follows:

PF = 0.333 EP + 0.333 EF + 0.067 P1 + 0.067 P2 + 0.067 P3 + 0.067 P4 + 0.067 TI

EP: Mid-Term Exam	EF: Final Exam
P#: Quizzes	TI: Research paper

VIII. BIBLIOGRAPHY

1. **BESTEERFIELD, DALE**
   Quality Control (Spanish)
   Prentice Hall Editorial, 4th edition, Mexico (2004)

2. **MONTGOMERY, DOUGLAS**
   Introduction to Statistical Quality Control (Spanish)
   Limusa Wiley Editorial, 4th edition (2001)

3. **JURAN J. AND GRINA F.**
   Quality Analysis and Planning (Spanish)
   Mc Graw Hill, 3rd Edition, Mexico (1995)