



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF CHEMICAL AND TEXTILE ENGINEERING
TEXTILE ENGINEERING PROGRAM

PIT51 – TEXTILE QUALITY CONTROL I

I. GENERAL INFORMATION

CODE	: PIT51 Textile Quality Control I
SEMESTER	: 5
CREDITS	: 3
HOURS PER WEEK	: 5 (Theory–Practice)
PREREQUISITES	: MA611 Statistics and Probabilities PIT01 Introduction to Textile Engineering
CONDITION	: Compulsory
DEPARTMENT	: Textile Engineering

II. COURSE DESCRIPTION

The course prepares students in the understanding and application of methods and techniques for the control and quality assurance of textile fibers. Students measure and analyze quality measures such as humidity, fiber length, maturity, strength and impurities content. Students apply proper norms and standards for measuring and certifying the quality of cotton and wool fibers.

III. COURSE OUTCOMES

At the end of the course, students:

1. Determine and interpret the characteristics of textile fibers.
2. Understand and apply fiber quality control methods.
3. Apply statistical methods for quality control analysis and decision making.
4. Know and use national and international technical standards to evaluate cotton and wool fibers.
5. Construct models of chart control for evaluating production levels.
6. Design quality certificates for fiber marketing.
7. Know and use appropriate equipment, instruments, materials and scales for evaluating the quality of textile fibers.

IV. LEARNING UNITS

1. TOTAL QUALITY

Introduction / Quality evolution and definitions / Total quality / Quality statistical control / Factors affecting quality / Deming and administration principles / Juran and steps for quality improvement / Crosby and quality / Fourteen points for a good quality administration / Process control and control points / 5's definitions and benefits / Quality control circles.

2. TECHNICAL NORMS FOR TOTAL QUALITY

ISO norms / ISO 9000 certification / Certification process / Peruvian technical norms / Process for obtaining ISO certification / ASTM norms / BASC and WRAP norms.

3. STATISTICS FUNDAMENTALS

Statistical methods / Definition of population, sample, sampling error, data / Position and dispersion statistical parameters / Mean square deviation / Linear irregularity / Error practical limit / Mean accuracy / Histograms: frequency distribution, construction and types / Statistical graphics.

4. STATISTICAL QUALITY CONTROL CHARTS

Control chart / Control limits / Advantages of using charts / Chart elaboration steps / Guide for chart selection and interpretation.

5. CONTROL GRAPHICS

Control variable graphics / X-R graphics / Graphic construction / Interpretation.

Attribute control graphics / Percentage control graphics / P charts / Defects control graphics / Pn charts / Graphics construction and interpretation / C charts.

6. QUALITY CONTROL EQUIPMENT AND ANALYSIS OF FIBER CHARACTERISTICS

Laboratory equipment for fiber analysis / Uster and Shirley developments / Analysis of fiber characteristics.

7. HUMIDITY AND ITS INFLUENCE ON TEXTILES

Textile fiber absorption and desorption / Fiber humidity / Corrections for humidity recovery / Humidity determination methods / Standard and commercial Regain tables / Technical norms / Certifications.

8. FIBER LENGTH

Automated analysis of fiber length / Fibrographer / Sutter web / ASTM technical norms / Cotton fiber length determination.

9. COTTON MATURITY AND FINENESS

Cotton development level and secondary wall / Maturity degree measurement methods / Maturity measurement equipment / Fiber fineness measurement systems / Fineness standard table / Micronaire affecting factors / ASTM norms / Fineness measurement equipment.

10. COTTON STRENGTH

Presley analyzer / Analyzer functioning and parts / Presley index / ASTM technical norm.

11. IMPURITIES CONTENT IN COTTON FIBER

Diagram for determining impurities content / Shirley equipment / Calculations.

12. HVI AND AFIS SYSTEMS

Introduction / Sampling conditions / Equipment calibration / HVI and AFIS differences / Measurement principle.

13. QUALITY CONTROL OF WOOL FIBERS

Parameters affecting wool quality / Wool characteristics / IWTO technical norms.

V. LABORATORY AND PRACTICAL EXPERIENCE

Laboratory 1: Analysis of humidity of textile fibers

Laboratory 2: Fiber length

Laboratory 3: Cotton fiber fineness

Laboratory 4: Traction strength of cotton fiber

Laboratory 5: Impurities content and clean fiber

VI. METHODOLOGY

The course takes place in theory, practice and laboratory sessions. In theory sessions, faculty presents the concepts and methods. In practice sessions, students solve diverse problems related to quality control of cotton and wool textile fibers using technical norms and standards. In laboratory sessions, students carry out experimental tests to validate quality control methods. At the end of each experiment, students present a report summarizing procedure, results, drawings and conclusions. Student active participation is promoted.

VII. GRADING FORMULA

The Final Grade PF is calculated as follow:

$$PF = (EP + 2*EF + PP) / 4$$

EP: Mid-term Exam EF: Final Exam

PP: Average grade of Practices and Laboratory work.

VIII. BIBLIOGRAPHY

1. GROVER Eliot and HAMBY D.

Handbook of Textile Testing and Quality Control.

2. BOOTH J.E.

Principles of Textile Testing.