



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

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**PIT01 – INTRODUCTION TO TEXTILE ENGINEERING**

**I. GENERAL INFORMATION**

<b>CODE</b>	: PIT01 Introduction to Textile Engineering
<b>SEMESTER</b>	: 2
<b>CREDITS</b>	: 5
<b>HOURS PER WEEK</b>	: 5 (Theory, Practice)
<b>PREREQUISITES</b>	: PI118 Information Systems and Technical Reports
<b>CONDITION</b>	: Compulsory

**II. COURSE DESCRIPTION**

The course prepares student for understanding of the different stages that make up the productive chain of the textile and clothe manufacturing sectors. Students understand the different types of textile fibers, as well as the processes of spinning, weaving, knitting, dyeing, finishing and clothe manufacturing. Students analyze the required materials, machinery and production processes, as well as the history, evolution and future of the textile industry.

**III. COURSE OUTCOMES**

At the end of the course, students:

1. Understand and explain the characteristics, properties and behavior of materials used in different steps of textile productive chain.
2. Understand the fabrication processes, production and manufacturing of the different sectors of the textile industry from fiber to final clothe.
3. Know and recognize the main machinery and instruments used in the textile industry.
4. Know the history and evolution of textile engineering and industry.
5. Get interested for deepen the knowledge on the textile industry.

**IV. LEARNING UNITS**

**1. INTRODUCTION AND GENERAL CONCEPTS**

Generalities on textile industry / From fiber to clothe / Textile history / Modern textile industry / Computer and industrial automation.

**2. TEXTILE FIBER. USES AND CLASSIFICATION**

Textil fiber / General classification / Textile classification according to CIU / Use of textile fibers.

**3. PROPERTIES OF TEXTILE FIBERS**

Fibers molecular structure / Geometrical properties / Physical properties / Optical and thermal properties / Mechanical properties / Chemical properties / Other properties.

**4. NATURAL CELLULOSIC FIBERS**

Cotton / Jute / Flax and hemp / Ramie and sisal / Generalities / Producers / Chemical composition / Commercial classification / Types / Physical, chemical and microscopic properties.

## **5. PROTEIN FIBERS**

Wool and hair / Sources / Molecular structure / Chemical composition / Approximated structural formula / Classification / General properties.

Silk / Fiber formation / Chemical composition / Silk types / Properties.

## **6. MINERAL FIBERS AND MANUFACTURED FIBERS**

Mineral fiber (asbestos) / Sources / Types / Properties.

Manufactured fibers / Spinning / Most important characteristics / Consumption at global level.

## **7. SPINNING**

Thread torsion / Spinning systems / Winding / Winding types / Spinning machinery.

## **8. FLAT WEAVING**

Flow diagram of a flat fabric plant / Warping / Gumming / Gumming products / Formation of a flat fabric / Machinery / Basic ligaments / Frame movement / Computer aided design.

## **9. KNITTING**

Definition / Loops / Columns and passage / Net types / Gauge and needle / Knitted fabric / Basic ligaments / Other ligaments / Machinery / Knitting by warping /

## **10. DYEING**

Previous processes / Materials / Factors and parameters to be considered / Color, colorant / Dyeing curve / Dyeing process / Colorant classification / Dyeing methods / Machinery / Data color.

## **11. TEXTILE FINISHING**

Definition / Basic operations: humidification, drying / Finishing classification: perched, calendered, wash and wear, untreatable, soil release, anti-stain and non-flammable, anti-static, mercerized, non-shrink, permanent press.

## **12. CLOTHING MANUFACTURE AND QUALITY CONTROL**

Industrial clothes manufacture / Flow from fabric to clothes / Materials and equipment / Quality control in every step of the process / Quality control instruments.

## **V. METHODOLOGY**

The course takes place in theory and practice sessions. In theory sessions, faculty presents the concepts and methods. In practice sessions, students analyze different applications of chemical engineering and textile engineering. Students work in groups to complete a report on the technologies supporting a given chemical or textile industry field. Student's active participation is promoted throughout the course.

## **VI. GRADING FORMULA**

The Final Grade PF is calculated as follow:

$$PF = (EP + 2 EF + PL) / 4$$

EP: Mid-term Exam.

EF: Final Exam.

PL: Average grade of Practice Works.

## **VII. BIBLIOGRAPHY**

### **1. HOLLEN Norman**

Textiles

Prentice Hall, 2000.

### **2. TORTORA Phillips**

Understanding Textiles

Mc Graw Hill, 1980.