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

PIT22 – THREAD FORMATION SYSTEMS II

I. GENERAL INFORMATION

CODE	**:**	PIT22 Thread Formation Systems II
SEMESTER	**:**	4
CREDITS	**:**	3
HOURS PER WEEK	**:**	5 (Theory, Practice, Workshop)
PREREQUISITES	**:**	PIT21 Thread Formation Systems I
CONDITION	**:**	Compulsory
DEPARTMENT	**:**	Textile Engineering

II. COURSE DESCRIPTION

The course continues with the study of the process for transforming natural threads into carded belts. Students deepens in the study of spinning and carding machines, integrate spinning and carding process with optimality criteria making an overall balance according to the required production capacity and waste minimization, and apply quality control methods.

III. COURSE OUTCOMES

At the end of the course, students:

1. Explain the functioning principles of spinning machines describing their mechanical, pneumatic and electronic parts.
2. Identify the quality control parameters according to the textile fiber and spinning machines.
3. Analyze and integrate spinning and carding processes for optimizing the production process.
4. Carry out mass and overall balance analysis of spinning and carding plants according to the production capacity of the textile plant.
5. Understand and explain quality control methods and appraise its importance in thread formation systems.

IV. LEARNING UNITS

1. MANUAR MACHINE

Objectives / Process description / Machine parts and components / Stretching systems and pendulum arms / Roller types and hardness / Production levels / Title ranges / Self-regulated systems / Pressure / Regulation with and without bars for fiber control / Velocities / Waste / Automatic control / Future trends.

2. INTERPRETATION OF USTER GRAPHICS

Uster graphics / Interpretation of Uster graphics / Defect types / Faults / Defect determination and location / Effect of defects on thread final quality.

3. WASTE EVACUATION SYSTEM AND CLIMATIZATION

Objectives / Functioning / Evacuation system for each spinning process machine / Layout of a waste evacuation system / Climatization and humidification systems / Temperature and humidity values for each area of spinning system.

4. **GATHERING MACHINE**
   Objective / Stretching range / Process description / Pre-combing systems / Velocities / Line balance up to pre-combing machine.

5. **COMBING MACHINE**
   Objectives / Comparative of a carded line system / Process description / Machine most relevant parts / Machinery types / Movement setting and synchronization / Stretching and production levels / Waste control.

6. **WOOL SPINNING**
   Spinning process of carded and combed wool / Machine parts / Comparison between carded and combed spinning / Intersecting and gills / After-comb processes / Stretching ranges.

7. **MILL**
   Objectives of milling / Process description / Machinery parts / Bobbin formation / Stretching system and pendulum arms / Condensers / Stress / Production calculations / Diagrams / Torsion and its characteristics / Velocities / Fault determination / Differential mechanisms.

V. WORKSHOPS AND PRACTICAL EXPERIENCE

- Manuar machine
- Interpretation of Uster graphics
- Gathering and combing machines
- Wool spinning

VI. METHODOLOGY

The course takes place in theory, practice and workshop sessions. In theory sessions, faculty presents the concepts, methods and applications. In practice sessions, students solve diverse problems related to thread formation systems including different types of machines used for formation. In workshop sessions, students set and use opening, cleaning, spinning and carding machinery in real operating conditions. Students visit textile industry plants to analyze thread formation processes. Student active participation is promoted along the course.

VII. GRADING FORMULA

The Final Grade PF is calculated as follow:

PF = (EP + EF + PP) / 3

EP: Mid-term Exam EF: Final Exam
PP: Average grade of Practical and Experimental Work.

VIII. BIBLIOGRAPHY

1. **FELIU Marsal**
   Production and Quality Management in Textile Industry, 2005

2. **OESER Werner**
   Cotton and Wool Spinning, Spain, 2000.