



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

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**PIT39 – TEXTILE CHEMICAL PROCESSING I**

**I. GENERAL INFORMATION**

<b>CODE</b>	: PIT39 Textile Chemical Processing I
<b>SEMESTER</b>	: 8
<b>CREDITS</b>	: 2
<b>HOURS PER WEEK</b>	: 2 (Theory-Practice)
<b>PREREQUISITES</b>	: PIT11 Textile Fiber Sciences
<b>CONDITION</b>	: Compulsory
<b>DEPARTMENT</b>	: Textile Engineering

**II. COURSE DESCRIPTION**

The course prepares students in the analysis and application of fiber and fabric washing and bleaching, as well as preliminary humid processes. Students know washing and bleaching machinery used in industrial chemical bleaching, and analyze and interpret obtained results according to national and international norms and standards. Students also analyze possible fabric damage due to bleaching.

**III. COURSE OUTCOMES**

At the end of the course, students:

1. Understand and analyze gassed process and technologies applied to textile fabric.
2. Understand and analyze degumming and scruffy processes for different types of fabric.
3. Understand and analyze fiber washing process.
4. Understand different bleaching process and technologies for cotton, wool, linen and silk fiber and fabric.
5. Understand and apply optical bleaching process for different types of fabric.
6. Understand and analyze possible fiber and fabric damage due to bleaching.

**IV. LEARNING UNITS**

**1. GASED**

Thread and fabric gassed / Gasses technology / Equipment / Conventional gassed / Infrared light gassed.

**2. DEGUMMING**

Warp degumming / Glue agents / Degumming procedures / Degumming in acid mean / Oxygen degumming / Enzymatic degumming / Degumming with organic solvents.

**3. SCRUFFY**

Flat and knitted fabric scruffy / Conventional scruffy / High temperature scruffy / J chambers / Pressurized steam chambers / Unpacking, scruffy and bleaching in continuous processes.

**4. BLEACHING**

Cellulosic textile chemical Bleaching / Cotton Bleaching / Most important chemical agents / Hydrogen peroxide / Sodium chlorite / Sodium hypochlorite.

**5. COTTON BLEACHING**

**Cotton Bleaching with hydrogen peroxide** / Chemical mechanisms of Bleaching process / Cold Bleaching / High temperature Bleaching / Exhaustion Bleaching / Continuous Bleaching process / J box chamber / Overlock chambers.

**Cotton Bleaching with sodium chlorite** / Chemical mechanisms of Bleaching process / Theoretical fundamentals / Bleaching machinery / Bath circulating Bleaching / Pad-Roll Bleaching / Corrosion produced by Bleaching agents.

**Cotton Bleaching with sodium hypochlorite** / Cotton and cellulosic fabric Bleaching / Theoretical fundamentals / Technical limitations.

## 6. LINEN BLEACHING

Bleaching process / Humid process / Bleaching in combined processes / Fabric damage produced by Bleaching / Oxy-cellulosic and hydro-cellulosic / Damage chemical evaluation / Ammonia copper hydroxide (Schweitzer reactant) / Results interpretation.

## 7. WOOL WASHING AND SCRUFFY

Wool washing / Wool scruffy / Classification of wool impurities: grease, wax, sweat / Wool aqueous washing / Machinery / Aqua jet / Washing with organic solvents / Water and solvent combined washing.

## 8. WOOL AND SILK BLEACHING

Wool chemical Bleaching / Bleaching agents / Oxidant agents / Reduction agents / Bleaching with hydrogen peroxide in alkaline mean and acid mean / Bleaching with reducing agents: sulfur dioxide, sodium dithionate, sulfoxylate, formaldehyde / Silk chemical Bleaching / Preliminary process / Silk degumming / Bleaching with hydrogen peroxide.

## 9. OPTICAL BLEACHING

Optical bleaching agents / Fluorescence / Chemical structure of optical whitener for cellulosic fiber, protein fiber and synthetic fiber.

## 10. WATER AND AUXILIARY AGENTS

Water conditioning for Bleaching, degumming and scruffy processes / Auxiliary agents in Bleaching, degumming and scruffy processes (humectants, detergents, sequestering agents, soaps, etc).

## V. 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 washing and bleaching of different types of textile fibers and fabric. In laboratory sessions, students carry out experimental tests to analyze washing and bleaching performance. At the end of each experiment, students present a report summarizing procedure, results, drawings and conclusions. Student active participation is promoted.

## VI. GRADING FORMULA

The Final Grade PF is calculated as follow:

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

EP: Mid-term Exam

EF: Final Exam

PP: Practical Work

## VII. BIBLIOGRAPHY

### 1. TROTMAN E.R.

Textiles Scouring and Bleaching

### 2. SADOV F., KORCHAGIN M.

Chemical Technology of Fibrous Materials