Curriculum for “Certificate in Latex Science and Technology”

Semester 1

Introduction to Latex Technology and Colloidal Science
Natural Rubber Latex & Latex Concentrate
Pre-Vulcanization of Natural Rubber Latex
Synthetic Lattices
Introduction to Latex Blends

Semester 2

Compounding Ingredients and Their Preparation
Mix / Compound Design and Vulcanization Chemistry
Mixing / Compounding
Latex Modification
Effluent Treatment System
Testing, TQM, QC and Lean Manufacturing

Semester 3

Casting Technology
Dipping Technology
Extrusion Technology
Foaming Technology
Latex Adhesive
Industrial Attachment / Project
SUBJECT SINOPSIS

Introduction to Latex Science and Technology

This course provides a basic knowledge of latex science and overall understanding of latex technology. For the latex science, it will emphasis on classification and naming of lattices; nature and structure of lattices, e.g., classifications, types and properties of both natural and synthetic lattices; study of colloidal systems and hydrocolloids, e.g., colloidal dispersions/solutions/emulsions/suspensions and their characterizations; stabilization, destabilization of lattices; molecular weight and molecular weight distribution. For the latex technology it will cover the latex raw materials, latex processing and latex products manufacturing. On satisfactory completing the course students will be able to explain the fundamental principles of science and technology of latex.

Latex Materials

This course introduces students to all compounding ingredients used in the manufacturing of latex products, their importance and significance, storage and handling of the materials. The ingredients include the latex itself (natural and synthetics) – its source, manufacture, grades, properties and applications and the compounding ingredients include processing aids, curatives, activators, accelerators, fillers, anti-degradants, miscellaneous ingredients and latex blends (types / grades and functions). The course also covers latex mix / compound design. At the end of the course students will be able to select latex / compounding ingredients and able to design formulations for specific end latex products.

Latex Processing

This course covers the principles of the basic processing operations such as mixing and compounding of latex, latex and compounding ingredients preparations, pre-vulcanization and vulcanization technology. On completing the course, students will be able to understand the importance of processing operation and its relevance to fabrication techniques; description of general construction, functions and uses of downstream machineries for casting, dipping, extrusion and foaming.

Latex Products Manufacturing

This course covers all latex products manufacturing processes such as casting, dipping, extrusion and foaming. Students will be exposed to the various manufacturing methodologies, merits of each method and able to understand any typical problems during manufacturing. At the end of the course, besides understanding all the manufacturing processes, students would be able to trouble shoot if problems during manufacturing occur.
Quality Control and Testing of Latex and Latex Products

This section covers the need of testing of latex and latex products – the precautions and standardization requirements. Students will be taught the principles for all unvulcanized and vulcanized latex testing methods and also of products that include all physical, mechanical and dynamic tests. It also includes TQM, SPC and Lean Manufacturing. At the end of the course students will be able to understand the significance of quality and able to carry out their own testing if necessary.

Latex Processing (Laboratory 1)

This course is designed to expose students to basic laboratory works of preparation of NR latex concentrate, its characterization, compound testing and processing of latex. Selected experiments include DRC and TSC measurements, VFA and MST, molecular weight determination, viscosity and rheometer measurements. It will emphasize on the application of theory to practice and development of teamwork and technical report writing skills. At the end of the course students should be able to perform, understand and describe the basic experimental works, justify and explain the polymer structure and properties relating to rubbers. Students should also be able to write reports in a professional practice and able to work in a team.

Rubber Processing (Laboratory 2)

This course is designed to expose students to laboratory works of formulation / compound design and compound preparations, fabrication techniques for specific latex products and appropriate testing. Selected experiments include all vulcanizate physical testings like tensile properties, hardness, resilience, tear resistance and product performance properties, etc. Specific product manufacturing includes casting, dipping, latex thread and foam. At the end of the course students should be able to design formulations with specified properties and able to fabricate specific latex products. Students should also be able to write reports in a professional practice and able to work in a team.

Industrial attachment / project

This course is designed for students to get the experience of real factory conditions especially in the latex product manufacturing sector, working with actual factory size rubber processing and manufacturing equipment. At the end of the course students would be able to use this experience and apply to real factory conditions when they graduate from the course.