

## **MODULE SYNOPSIS**

### **PDC 1: Certificate in Functional Materials for Performance**

#### *Specialty Chemicals*

This module provides an overview of the chemistry and functionalities of specialty chemicals such as surfactants and additives that are utilised in high performance applications (e.g. consumer care, lubricants, adhesives, coatings, paints etc.). They may be categorised according to their functions such as dispersants, foam boosters, wetting agents, emulsifiers, cleansing agents, solubilisers, photoinitiators, colourants, light stabilisers, aesthetic enhancers, protective barriers, preservatives and others. The effective application of the ingredients will influence the final qualities of the formulations in accordance to specific requirements.

#### *Specialty Polymers*

This module covers the science of macromolecules in terms of the underlying principles of chain- and step-growth polymerisation, concepts of average molecular mass and its distribution, polymer solution and rheology behaviour. It further develops an in-depth understanding of the relationship between structure, property and application of the various thermoplastics and thermosets.

#### *Performance Evaluation Techniques*

This module aims to investigate the chemical composition, morphology, thermal, mechanical and physical properties of materials. It covers the working principles of a wide range of instrumentations for chemical analysis and material characterisation. Students will learn the application of UV-Vis/FTIR/ICP-OES and EDS spectroscopy, HPLC/GC and LC-MS/GPC chromatographic techniques, TGA, DSC, light scattering/diffraction, microscopic methods, etc. for performance evaluation purposes.

### **PDC 2: Certificate in Product Design and Formulation**

#### *Formulation Science and Technology I*

This module aims to develop an in-depth understanding of science underlying the formulation of stable colloidal systems. Students will hone their ability to generate creative ideas and design product formulations with appropriate evaluation protocols that would bring about desirable attributes required for specific applications in consumer care. Students will be able to rationalise the underlying chemical interactions of the various ingredients as well as the principles of the different delivery mechanisms in a formulation.

#### *Formulation Science and Technology II*

This module further extends the application of the formulation principles for other industrial product formulations (i.e. coatings, lubricants etc.). Students will leverage on the formulation science and technology to create feasible solutions for various end-use situations. With the help of case studies, students will be able to design product formulations and evaluation protocols to meet the desirable performance requirements in the targeted field of application.

#### *Product Design and Development*

This module analyses the different stages of new product development process (NDP) with a focus in the concepts and challenges central to product innovation, including economic, environmental, regulatory considerations during the design and development process. The principles and techniques of quality design, quality assurance and project management will also be employed.