Module Synopses

PDC 1: Certificate in Advanced Materials for Performance (105 hours)	
Module 1: Functional Materials (30 hours)	This module covers the concepts and principles of the latest scientific advances and technological know-hows employed which may include microencapsulation, semiconductor encapsulation, nanomaterial and composite technologies.
Module 2: Environmental Sustainability and Materials (30 hours)	The module introduces the environmental aspects of materials, product life cycle assessment, and relevant materials research for environmental and energy applications.
Module 3: Materials Characterisation (45 hours)	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 different equipment for characterisation and analysis purposes.
PDC 2: Certificate in Advanced Materials for Technology and Product Development (105 hours)	
Module 4: 3D Printing Technology (30 hours)	This module provides practical industry knowledge in selecting 3D printing materials and processes, and how to integrate 3D printing technologies with traditional manufacturing techniques for end-part production.
Module 5: Product Formulation (45 hours)	This module provides the application of the formulation principles for other industrial product formulations (i.e. coatings, lubricants etc.). Students will leverage on the product 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.
Module 6: Product Innovation (30 hours)	This module analyses the different stages of new product development or improving on existing one 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. Design Thinking methodology will be introduced.
PDC3: Certificate in Advanced Materials for Microelectronics (270 hours)	

Module 7: Semiconductor Essentials (30 hours)	This subject provides the basics of semiconductor devices for students. The major objective is to familiarize the students with the basic principles of operation of modern semiconductor devices such as p-n junction diode, light emitting diodes, MOS transistors, bi-polar transistors, solar cell, micro-wave devices.
Module 8: Microelectronics Process and Nanofabrication (30 hours)	The major objective of this subject is to introduce the students to the materials and engineering aspects of Silicon microelectronic processes, wafer processing methods and steps. Successful completion of this subject should give the students an in-depth understanding of microelectronic device processing, and help them to appreciate the materials design requirements of metal oxide semiconductor devices.
Module 9: IC Reliability and Failure Analysis (30 hours)	Common reliability methodologies and FA techniques/tools to be introduced.
Module 10: Practicum (180 hours)	This module enable students to consolidate and apply theoretical knowledge learnt in different emerging topics in advanced materials of each of the three PDCs, to work on curated used cases/ industrial projects, which are relevant to course and industry.