MINIMUM CORE SUBJECT AREAS: CHEMICAL ENGINEERING

AREA	SUBJECTS / DESCRIPTION	RECOMMENDED CONTACT HOURS
A recommendation of 60 hours from each area in Group 1 and 120 hours total from at least 2 out of 8 areas in Group 2.		
Group 1: 60 hours from each of the following areas:		
1. Theory in Chemical Engineering	- selected topics on thermodynamics, fluid mechanics, heat and mass transfer etc.	60
2. Process Engineering	- selected topics on process principles and engineering economics; stoichiometry and reaction equilibria; reactions kinetics; material and energy balance, separation processes etc.	60
Group 2: 120 hours from at least 2 out of 8 areas:		
1. Control Engineering	- selected topics on transfer function; dynamics of first - and higher-order systems; feedback and feedforward controls; controller tuning	
2. Material Science	- selected topics on different categories of materials and their applications; structures at molecular scale; science and engineering of materials	
3. Environmental Engineering	- selected topics on wastes and pollutants treatment; behavior of toxic chemicals in atmospheric, soil and aquatic environments; environmental control; impact and management systems; pollution control; environmental management and auditing systems	
4. Biomolecular Engineering	- selected topics on bioproducts; cellular production techniques; product formulation; molecular biology; protein engineering; enzyme kinetics; energetics of biological systems; molecular and cellular processes; bioreaction networks and metabolic engineering	
5. Manufacturing Engineering in Chemical Products	- selected topics in specific manufacturing processes, such as pharmaceutical industry, food industry, hygiene and personal care etc. The topics may cover product and process design, quality assurance and control	
6. Project Management	- selected topics on process / product design; process safety; financial management for chemical engineering projects; risk management, decision making	
7. Process Risk and Safety	- selected topics on process risk and safety management; Health Safety and Environmental Management System; qualitative and quantitative risk analysis; technical process safety; As Low As Reasonably Practical (ALARP) approach and risk reduction	
8. Topics on measurements and instrumentation, advanced computational modelling / engineering analysis		