

1.	Title of the course	Process Synthesis and Economics
2.	Course number	CH4101
3.	Status of the course	Core
4.	Structure of credits	3-0-0-3
5.	Offered to	UG
6.	New course/modification to	New course
7.	To be offered by	Department of Chemical Engineering
8.	To take effect from	July 2020
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective(s): To provide the fundamentals of conceptual process design and develop systematic methods for flowsheet synthesis. To introduce the economic principles of process industry.	
12.	Course Content: Process economics: principles, cost estimation, depreciation and total annualized cost, cost indices, rate of return, payback period, discounted cash flow; Conceptual process synthesis: hierarchical synthesis of flowsheets, examples of industrial flow sheet from inorganic chemical industry, fertilizers, petroleum refining, petrochemicals and polymers; Philosophy of targeting, thermodynamic and mathematical programming approaches; Reactor network synthesis: choosing type of reactor and conditions for simple reaction systems; Separation system synthesis: distillation column sequencing and integration; Heat exchanger network synthesis: pinch technology, targets for minimum utilities, area, total cost; Process integration: maximum energy recovery design, heat and power integration.	
13.	Textbook(s): 1. Peters M S, Timmerhaus K D and West R E, <i>Plant Design and Economics for Chemical Engineers</i> , 5th Edition, Tata McGraw Hill (2011). 2. Smith R, <i>Chemical Process Design & Integration</i> , 2nd Edition, Wiley India (2014).	
14.	Reference(s): 1. Austin G T, Shreve N R and Brink J A, <i>Shreve's Chemical Process Industries</i> , 5th Edition, Tata McGraw Hill (2012). 2. Biegler L T, Grossmann I E and Westerberg A W, <i>Systematic Methods for Chemical Process Design</i> , Prentice Hall (1997). 3. Douglas J M, <i>Conceptual Design of Chemical Processes</i> , McGraw Hill (1988). 4. Seider W D, Seader J D and Lewin D R, <i>Product and Process Design Principles - Synthesis, Analysis and Evaluation</i> , 3rd Edition, Wiley India (2015).	