

1.	Title of the course	Process Synthesis and Economics
2.	Course number	CH401L
3.	Structure of credits	3-0-0-3
4.	Offered to	UG
5.	New course/modification to	Modification To CH4101/12
6.	To be offered by	Department of Chemical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	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.	
10.	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.	
11.	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).	
12.	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).	