UNIVERSITY OF MADRAS

M.Sc. DEGREE PROGRAMME IN CHEMISTRY

SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Course: **524C3D: CORE INDUSTRIAL MODULES**

Unit-I: Principles of Chemical Technology and Industrial Processes

Introduction–Importance of Chemical Technology–Designing and Modeling of Chemical Plants– Unit process and Unit operations.

Basic requirements of Industrial Reactors–Choice and selectivity of reactor–basic principles of homogeneous and heterogeneous processes and reactors with examples.

Unit-II: Raw Materials and Energy for Chemical Industry

Raw materials–Characteristics of raw materials and their resources–methods of raw material concentration– integral utilization of raw materials.

Energy for Chemical Industry–power and fuels–classification of fuels–coal–fuel gases and liquid fuels – petroleum.

Unit-III: Business Considerations

Introduction to Business Considerations – Details about Six Sigma - Stage-Gate.
Details about Organization - Gantt Charts - Cost Estimates - Scale-up Considerations

Unit-IV: Chemometrics

Chemometric- Definition–Types–Classification–Difference between Chemometric and Chemo Informatics–Techniques–Process (Mathematical and Statistical data).

Analysis of Chemometric–Applications of Chemometric.

Unit-V:Industrial Safety

Safety signs and Colors used in Industries–Industrial Hazards and Accidents

Classification of Hazards–Physical, chemical Biological, Ergonomic and stress Hazards –Causes, prevention and control

References:

1. Chemical Technology, Vol.1 by Mukhlynov (Ed.), Mir Publication, Moscow, 3rd Edn., (1979).
2. Environmental Chemistry by A.K. De, Wiley Eastern Ltd.,2nd Edn.,Meerut(1989).
1. Process Know-How and material of construction for Chemical Industries by R.K. Goel, S.B. Publ., Delhi, (1977).
2. Fundamentals of Industrial Chemistry-Pharmaceuticals, Polymers, And Business by John A. Tyrell by John Wiley & Sons, Inc.,(2014).
3. Chemometrics: A Textbook by D.L.Massart, B.G.M.Vandeginste, S.M.Deming, Elsevier Science BV. (2003).
4. Industrial Chemistry by B.N. Chakrabarthy, Oxford and IBH Publ., Now Delhi,(1984).
5. Chemical Process Industries by R.Norris Shreve and J.A.Brink, Jr.4th Edn., McGrawHill, 6. Tokyo, (1977).
6. Industrial Safety and Environment by A.K. Gupta Laxmi Publications Pvt Limited,(2008).

Further Reading:

1. H.A.Strobel,Chemical Instrumentation: A Systemati capproach, 2nd Edition (1973) Addition Wesley,Reading,Mass.
2. An introduction to Industrial Chemistry Second Edition Edited by R Heaton, Blackie Academic & Professional, An imprint of Chapman & Hall, UK(1994).
3. Handbook of Industrial Chemistry and Biotechnology by James A. Kent Tilak, V. Bommaraju ScottD.Barnicki,13th Edition,Springer InternationalPublishing,2017.
4. Principles of Chemical Reactor Analysis and Design: New Tools for Industrial Chemical Reactor by UziMann,2nd Ed.JohnWiley &Sons, Inc. (2009).
5. R.L.Pecsok,L.D.Shields,T.CavinsandL.C.Mcwilliam,2nd Edition ,John Wiley & Sons.(1976).
6. Chemical Methods of Separations by E.W.Berg, 1st Edition McGraw Hill, New, York,(1963).
7. G.D. Christian, Analytical chemistry, 5th Edition John Wiley & Sons, New York,(1994)..
8. Chemometrics by M.A.Sharat and D.L.Illuran,, John Wiley, New York.
9. Statistics for Analytical Chemists, Canlcutt and R.Roddy, Chapmam and Hall, New York.

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Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able:

PO1: To establish an Industry and the basic needs
PO2: To Integrate and Industries various modules of Industrial process
PO3: To understand the guidelines and safety during the operation of Chemical Industries
PO4 To create awareness to establish startup company with help of Government Funding Agency
PO5: The framed syllabus provide Indepth knowledge to develop and entrepreneurship among students community

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**
CO 2	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 3	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**
CO 4	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**
CO 5	**M**	**S**	**M**	**S**	**S**	**M**	**S**	**M**	**S**	**S**

CO-PO Mapping (Course Articulation Matrix)

3 – Strong, 2 – Medium, 1 - Low

Level of Correlation between PSO's and CO's

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 – Low