

I CHE111 Chemical Process Industries

Course Outline

- **Title:** Chemical Process Industries
- **Code Number:** CHE111
- **Semester:** 1st
- **Credit Hours:** 3
- **Pre-requisites course requirements/ skills:** Basic knowledge of chemistry
- **Learning Outcomes:**

Upon successful completion of the course, the students will be able to

1. Describe the significance and diverse applications of the chemical process industry (CPI)
2. Interpret and create basic process flow diagrams (PFDs) / Piping and Instrumentation Diagrams (P&IDs) using software like MS Visio.
3. Develop a PFD / P&ID diagram for a given chemical product.

- **Contents**

Unit I: Introduction and Fundamentals

- 1.1 Introduction to Chemical Engineering and Process Industry
- 1.2 History and Development of Chemical Process Industry.
- 1.3 Drawing Symbols of equipment used in a process industry.
- 1.4 Types of process diagrams
- 1.5 Drawing of process flow diagrams using computer software like MS Visio.

Unit II: Process Development

- 2.1 Dependence of Strategy on Product Type and Raw Materials
- 2.2 The Course of Process Development
- 2.3 Development of Individual Steps
- 2.4 Scale-up
- 2.5 Safety and Loss Prevention
- 2.6 Process Evaluation

Unit III: Inorganic chemicals manufacturing

- 3.1 Glass
- 3.2 Sulfuric Acid and Nitric Acid
- 3.3 Sodium carbonate and Sodium Hydroxide

Unit IV: Processes in Oil Refinery

- 4.1 The Oil Refinery Overview
- 4.2 Physical Processes
- 4.3 Thermal Processes
- 4.4 Catalytic Processes
- 4.5 Current and Future Trends in Oil Refining

Unit V: Production of Polymers

- 5.1 Polymerization Reactions
- 5.2 Polyethenes – Background Information
- 5.3 Processes for the Production of Polyethenes
- 5.4 Plastic Industries, Types of plastic resins and their manufacture, Synthetic fiber manufacture.

Unit VI: Fertilizer Industries

- 6.1 Urea manufacture
- 6.2 Ammonium Nitrate manufacture
- 6.3 Di-ammonium phosphate manufacture
- 6.4 Super phosphate manufacture.

- **Teaching-learning Strategies**

The teaching and learning strategy has been designed on the understanding of concepts and the ability to critically analyze and apply the learned content through lectures, discussion, activities, case studies using computer, multi-media and writing board instructional aids.

Lectures: 3 hours per week

- **Assignments- Types and Number with calendar**

A minimum of two assignments to be submitted before the written exam of final term

- **Assessment and Examinations**

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written examination at the mid-point of the semester.
2.	Formative Assessment	25%	It includes: classroom participation, attendance and assignments.
3.	Final Assessment	40%	Written examination at the end of semester.

- **Textbooks and Reference books**

1. Austin, G.T., (1984), "Shreve's Chemical Process Industries" 5th Edition, McGraw-Hill.
2. Kent, J.A. (2017) "Kent and Riegel's Handbook of Industrial Chemistry and Biotechnology" 13th Edition, Springer Science.
3. Chenier, P.J. (2002) "Survey of Industrial Chemistry", 3rd Edition, Springer Science.
4. Shahidi, F. (2005) "Bailey's Industrial Oil and Fat Products" Vol-V, 6th Edition, Wiley.
5. Mindess, S., Young, F. (1981) "Concrete" Prentice Hall.
6. Bhatia, S.C. (2004) "Chemical Process Industries" Vol-I, 2nd Edition, CBS.
7. Moulijn, J.A., Makkee, M., Diepen, A.E.V. (2013) "Chemical Process Technology" 2nd Edition, Wiley.
8. Pandey, G.N. (2000) "Textbook of Chemical Technology" 2nd Edition, Sangram Books.
9. Othmer, K. (2007) "Kirk Othmer Encyclopedia of Chemical Technology" Vol 1-26, 5th Edition, Wiley.
10. Parrish, A.E.M., Abraham, M.A. (2013) "Green Chemistry and Engineering: A Pathway to Sustainability" Wiley.