Department of Chemical Engineering

PROGRAM OUTCOMES (PO's)

The graduates will have ability to

1. Apply knowledge of science, mathematics and engineering fundamentals to the solution of problems of chemical engineering.
2. Identify and integrate the major elements to formulate and solve chemical engineering problems.
3. Design a system, component or process to meet desired objectives within realistic constraints such as economic, environmental, social, political, ethical, manufacturability, sustainability, health and safety aspect
4. Conduct experiments using research based knowledge and research method safely to analyze and interpret data to provide valid conclusions.
5. Create and use the appropriate techniques, resources, modern engineering tools and advanced software's necessary for model prediction and simulation of chemical engineering processes.
6. Apply reasoning informed by contextual knowledge to assess impact of contemporary issues as societal, health, safety, legal, cultural and consequent responsibilities relevant to chemical engineering practices.
7. Understand the impact of engineering solution in a global, economic, environmental, societal context and need for sustainable development.
8. Understand professional ethics, responsibilities and norms of chemical engineering practices.
9. Work effectively as a member in multidisciplinary teams to have better understanding of leadership.
10. Communicate effectively and comprehensively in oral and written form
11. Apply knowledge of chemical engineering and understand management principle to manage projects in multidisciplinary environment.
12. Recognize the need for and have an ability to engage in lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES

After graduation in chemical engineering the graduates will,

PEO1: Practice or apply successfully the principles of chemical engineering in variety of employment areas.

PEO2: Identify, formulate and solve the problems of chemical engineering design and acquire modern experimental concepts, techniques and tools.

PEO3: Train to apply computational as well as software skills to formulate and solve the problems related to chemical process development and economics.

PEO4: Achieve the chemical engineering professional standards, ethics, diversity and social responsibility, both as individual and in team environments.

PEO5: Pursue continued life- long learning through professional practice, further education or training program in chemical engineering or other professional fields.

PROGRAM SPECIFIC OUTCOMES (PSO's)

1. Graduates will be able to Model and simulate the chemical processes by using advanced software.
2. Graduates will be able to do Economic design and demonstrate safety and environmental aspects in chemical processes.
3. Graduates will be able to understand the impact of Chemical Engineering solutions within realistic constraints in global and societal context.

Course Name: BSC-CHE-301 ENGINEERING MATHEMATICS–III

Cos	At the end of successful completion of the course the student will be able to
C301.1	Solve Linear Differential equations with constant coefficient
C301.2	Make use of Linear Differential Equations to solve the chemical engineering problems.
C301.3	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.
C301.4	Solve differential equation Numerically.
C301.5	Find Laplace transforms of given functions.
C301.6	Use Laplace transform to solve linear differential equations.

Course Name: BSC-CHE-302 ADVANCED CHEMISTRY

C302.1	Apply & understand the knowledge of solvents in chemical reactions.
C302.2	Define & apply terms to express concentrations for Nernst and Henry 's law .
C302.3	Describe and explain types of Chemical bonding ,Electrochemistry and terms involved in Surface Chemistry
C302.4	Analyze and understand Reactive Intermediates and Types of Organic Reactions
C302.5	Explain and classify heterocyclic compounds.
C302.6	Interpret multidisciplinary nature of Biochemistry and Implement Nature bio molecules.

Course Name: PCC-CHE-303 MATERIAL SCIENCE & ENGINEERING

C303.1	Define Microstructure of the metals with composition
C303.2	Explain the simple phase drawing
C303.3	List the types of failure and explain how you can control them
C303.4	Analyze of stress for cracking
C303.5	Principles of material testing
C303.6	Separate the different methods of testing by their machine and their limitations

Course Name: PCC-CHE-304 FLUID MECHANICS

C304.1	Students will learn about Unit systems & Fluid statics with its applications
C304.2	Students will understand the behavior of fluid with Phenomena
C304.3	Student will understand the concept of incompressible fluid, interpret of friction losses.
C304.4	Student will able to recognize the concept of compressible fluid, differentiate the types of flow measuring devices with calculations
C304.5	Student will able to describe the mechanism of Flow past objects with design parameters.
C304.6	Student will understand the mechanism of agitation and design calculations.

Course Name: PCC-CHE-305 MECHANICAL OPERATIONS

C305.1	Learn fundamentals/basics such as characterization of particles
C305.2	Students will be able to understand the basics of size reduction
C305.3	Students will learn basics of mixing and blending and also learn the principles
C305.4	Students will be able to understand the details of filtration and sedimentation
C305.5	Identify industrial applications and principles
C305.6	Identify industrial applications and principles

Course Name: ESC-CHE-306P COMPUTER PROGRAMMING (C++)

C306P.1	Understand Introduction to programming languages.
C306P.2	Understand fundamentals of C++ languages.
C306P.3	Understand C++ Programming basics.
C306P.4	Analyze and understand Control Structures.
C306P.5	Use of Arrays and its types.
C306P.6	Analyze and apply Functions.

Course Name: CHE 307A AUDIT COURSE-III [ENVIRONMENTAL STUDIES]

C307A.1	Relate the interdependency of environmental components.
C307A.2	Identify the environmental problems and prevent environmentalpollution
C307A.3	Interpret impacts of waste on environmental components.
C307A.4	Analyze environmental change and its social impacts

Course Name: BSC-CHE-401 APPLIED MATHEMATICS IN CHEMICAL ENGINEERING

C401.1	To equip students with the concepts of partial differential equations and how to solve Partial Differential with different methods
C401.2	Study physical phenomena using PDE's (in particular using the heat and wave equations).
C401.3	Solve System of Algebraic and Transcendental Equations
C401.4	To represent Periodic Function by using Fourier Series.
C401.5	Understand the line of best fit as a tool for summarizing a linear relationship .
C401.6	Work numerically on the ordinary differential equations using different methods .

Course Name: BSC-CHE-402: ANALYTICAL CHEMISTRY

C402.1	To remember aspects of analysis.
C402.2	To understand applied analysis of different samples.
C402.3	To differentiate criteria for selecting instrumental methods.
C402.4	To discuss molecular spectral methods.
C402.5	To select atomic spectral methods and thermal methods for analysis.
C402.6	To demonstrate chromatographic and fluid extractive methods.

Course Name: PCC-CHE-403 CHEMICAL PROCESS CALCULATIONS

C403.1	Define the basic chemical calculations, conversions and the laws of gases system
C403.2	Explain combustion calculations and reactive, non reactive process
C403.3	Develop material balances on unit operations and processes
C403.4	Categorize the bypasses, recycle streams and their importance's
C403.5	Interpret material balance with and without chemical reactions
C403.6	Formulate simultaneous material and energy balances on various chemical operations

Course Name: PCC-CHE-404 HEAT TRANSFER

C404.1	Understand conduction, convection & Radiation and solve the problems.
C404.2	Demonstrate steady and unsteady heat conduction in one and three dimension.
C404.3	Apply heat transfer Principles in solving engineering problems that are related to heat transfer.
C404.4	Deal with practical problems in design of heat exchangers, evaporators, packed bed heat exchanger, Boiling & condensation related to chemical processes and perform such calculations manually & by using software.
C404.5	Analyze the performance of Heat exchange equipments.
C404.6	Apply heat transfer concepts for application in process safety, biological sciences, energy and environmental sciences.

Course Name: PCC-CHE-405 CHEMICAL ENGINEERING THERMODYNAMICS-I

C405.1	Define & describe the significance of thermodynamic properties of pure fluids & fluids in mixture.
C405.2	Apply the laws of thermodynamics to chemical engineering processes.
C405.3	Analyze & access thermodynamic properties, data from appropriate sources.
C405.4	Estimate differences in thermodynamic properties using equation of state, charts, tables & computer resources.
C405.5	Formulate thermodynamic calculations orientated to the analysis and design & efficiency of various energy related chemical processes.
C405.6	Interpret thermodynamic data for application in process safety, biological sciences, energy& environmental sciences.

Course Name: ESC-CHE-406P COMPUTING FOR ENGINEERS

C406P.1	To implement applications of MS Office in field of chemical engineering.
C406P.2	To get knowledge of variety of sensors which are used in domestic and industrial applications
C406P.3	To get awareness of cloud computing and its benefits in chemical engineering field.

Course Name: PCC-CHE-407P FLUID MOVING MACHINERY

C407P.1	To understand basic concepts of pumps and classification of pumps
C407P.2	To study performance characteristics liquid flow machineries
C407P.3	Explain mathematical calculations of pumps
C407P.4	To select appropriate type of pump
C407P.5	To study performance characteristics of gas flow machineries

Course Name: PCC-CHE-501 CHEMICAL REACTION ENGINEERING–I

C501.1	Ability to size batch reactors, semi batch reactors, CSTRs, PFRs, for isothermal operation given the rate law and feed conditions.
C501.2	Ability to define and develop rate equations for homogeneous reactions.
C501.3	Ability to derive design equations for different types of reactors based on mole and energy balance.
C501.4	Ability to relate rate of reaction with design equation for reactor sizing.

Course Name: PCC-CHE-502 MASS TRANSFER-I

C502.1	Define and describe diffusional operation with rate of mass transfer
C502.2	Identify and differentiate various mass transfer operations
C502.3	Use knowledge of mass transfer operations for designing mass transfer coefficient and cascade system
C502.4	Relate mechanism of absorption, adsorption with designing stages and height of packed tower
C502.5	Select contacting equipment and its design considerations
C502.6	Investigate the problems related to mass transfer operations

Course Name: PCC-CHE-503 CHEMICAL ENGINEERING THERMODYNAMICS II

C503.1	Define and understand the laws associated with ideal and non ideal solutions.
C503.2	Calculate properties of ideal & real mixtures based on thermodynamics Principles and apply knowledge of problem solving to thermodynamics
C503.3	Explain underlying principles of phase equilibrium in binary Component & multicomponent systems.
C503.4	Use activity coefficient models to calculate excess properties of liquids and Thermodynamics aspects of engineering design.
C503.5	Estimate equilibrium constant for chemical reactions and criteria for chemical Equilibrium in non-ideal mixtures
C503.6	Understand criteria for phase equilibrium and stability

Course Name: PCE-CHE-504 CHEMICAL EQUIPMENT DESIGN

C504.1	Recall their concept in designing the chemical equipments.
C504.2	Interpret causes of failure of chemical equipments.
C504.3	Model chemical equipments.
C504.4	Take part in remedial or preventive measurements to avoid failure of vessel with safe design guidelines.
C504.5	Evaluate and apply their ideas on dimensional analysis to explore the optimum design variables.
C504.6	Test the process equipment with prier safety.

Course Name: OEC-CHE-505 APPLICATIONS OF MATLAB

C505.1	Able to express programming & simulation for engineering problems.
C505.2	Able to find importance of this software for Lab Experimentation.
C505.3	Able to write basic Chemical Engineering problems in MATLAB & to use in research by simulation work.
C505.4	Able to connect programming files with GUI Simulink.

Course Name: OEC-CHE-505 ADVANCED INDUSTRIAL SOFTWARE'S

C505.1	To remember and understand basic concepts of simulation.
C505.2	Understand and apply open source simulation software DWSIM.
C505.3	To remember and analyse the distillation column using Chemsep.
C505.4	To understand basic concepts of Scilab.
C505.5	To understand basic concepts of SCADA.
C505.6	Understand and apply the CHEMCAD software for process simulation.

Course Name: MP-CHE-506T MINI PROJECT WORK

C506T.1	Understand, plan and execute a Mini Project with a team.
C506T.2	Implement basic engineering knowledge.
C506T.3	Prepare a technical report based on the Mini project.
C506T.4	Deliver technical seminar based on the Mini Project work carried out.

Course Name: PCC-CHE-601 PROCESS PLANT UTILITIES

C601.1	Chemistry of water, color codes and process steam as utilities.
C601.2	Different treatments to boilers feed water in process industries.
C601.3	The type of boilers, Indian boiler act.
C601.4	Interpret & formulate the thermal efficiency calculation of boilers as design aspects in industries.
C601.5	Principle & working of the compressed, instrumental air in process industries.
C601.6	Causes of Fire & protective measurements in industry.

Course Name: PCC-CHE-602 MASS TRANSFER-II

C602.1	Define and describe mass transfer operations with rate of mass transfer
C602.2	Identify and differentiate various mass transfer operations for selection
C602.3	Use knowledge of mass transfer operations for designing contacting equipment with optimizing parameter
C602.4	Relate mechanism of Distillation, Extraction, Leaching, Drying, Crystallization with designing stages and height of packed tower
C602.5	Select the specific operation contacting equipment and its design considerations
C602.6	Investigate the problems related to mass transfer operations

Course Name: PCC-CHE-603 PROCESS DYNAMICS & CONTROL

C603.1	Remember Laplace transform and to understand and model the dynamic behavior of chemical processes based on their time domain, Laplace domain
C603.2	Understand basic fundamentals of first and second order process dynamics and its behavior
C603.3	Know about applying fundamental knowledge to design controllers and the control system, the operation of P, I, D and PID controllers and to tune them.
C603.4	Evaluate different parameters affecting on the overall transfer function and response of process control system.
C603.5	Understand stability characteristics for design of process control systems & analyze the frequency response of the control system
C603.6	Develop the practical skill, team work and ethical thinking to choose right career in allied industries or higher studies

Course Name: PCC-CHE-604 CHEMICAL REACTION ENGINEERING – II

C604.1	Apply knowledge of non-ideal flow and will find conversion in actualreactors from experiment and different models for finding non ideality in reactors.
C604.2	Express basic concepts of mixing of fluids, macro fluid and Turbulent mixing with chemical reaction in Stirred Tanks.
C604.3	Express working of catalyst & understand industrial terms related to solid catalyst & find different characteristics of solid catalyst with its recenttrends.
C604.4	Explain underline principles, understanding & designing of fluid particle reactions with different models for it.
C604.5	Understand fluid-fluid reaction, its design and applications of fluid-fluid reactions rate equation to equipment design.
C604.6	Explain underline basic concepts, important parameters. Mechanism,applications of catalyst with different catalytic reactors and deactivating catalyst & also described scale up in reactor recent.

Course Name: OEC-CHE-605 INDUSTRIAL ECONOMICS, MANAGEMENT AND ENTREPRENEURSHIP

C605.1	Define basic models of behavior of firms and industrial organizations.
C605.2	Demonstrate the basic models of industrial economics.
C605.3	Solve analytical problems relating to industrial economics.
C605.4	Analyze the models to important policy areas and under the limitations of different behavioral theories.
C605.5	Compare the effective utilization of resource materials and chemical processes.
C605.6	Modify the present industrial economics, management status and forecast it with the improved feature.

Course Name: OEC-CHE-605 PROJECT MANAGEMENT AND SMART TECHNOLOGY

C605.1	Concepts and knowledge of project management to manage projects in process industries
C605.2	Prepare feasibility reports.
C605.3	Understand various clearances required to start industry
C605.4	Prepare project organization charts and contracts
C605.5	Prepare contracts
C605.6	Use tools of PM to solve problems

Course Name: ESC-CHE-606 P PROCESS SIMULATION LABORATORY

C606.1	Implement basic engineering knowledge to solve problems
C606.2	Understand ,Plan and Execute a chemical processes problems
C606.3	Write algorithm for the process problems
C606.4	Use commercial simulation tool like MATLAB, Scilab, Chemsep to solve Chemical Engg. problems

Course Name: CHE-607P INDUSTRIAL PRACTICES AND CASE STUDIES

C607P.1	Understand the difference between class room explanations and real life professional culture.
C607P.2	Describe various organizations involved in the chemical industry like Design, Research, Processing, Production, Market and Demand.
C607P.3	Opportunities for Employment and Self-Employment in the chemical sector after graduation.
C607P.4	Acquire through P & ID"s basic information of sources of raw materials, products, by- products of production activities andwhere they can be used.
C607P.5	Understand how industrial establishments are administered.
C607P.6	Know the Battery limits, Offsite facilities and the Overall Safety procedures.