## **B.Tech Courses**

### **Programme Compulsory Courses**

- Fluid Mechanics
- Data Structure and Algorithm
- Molecular Engineering
- Material and Energy Balance
- Mass Transfer I

#### • Heat Transfer

- Chemical Reaction Engineering
- Scientific Computations
- Transport Phenomena
- Mass transfer II

#### Chemical Engineering Design

- Understanding of fluid dynamics
- Process equipment design
- Ability to apply material and energy balance to chemical engineering systems
- Understanding of the mass transfer and unit operations
- Ability to design and operate chemical reactors
- Importance for mixing, equilibria and processes

#### Process Engineering Intelligence and Programming

- Dynamics and control strategies for linear and non-linear processes
- IoT and AI application
- Ability to design and implement appropriate
- Data Structures and Algorithms for real-world problems
- Supervised and unsupervised machine learning algorithms

- Process Plant Design & Economics
- Chemical Engineering Thermodynamics
- Process Control and AI Applications
- Heat Transfer-Lab
- Fluid Mechanics-Lab

#### Molecular Engineering

- Knowledge about organic materials for electronics and optoelectronics
- Inter-molecular forces present in self-assembly and fluid-like structures. forces present in Self-Assembly and fluid-like structures
- Specialization in the area of molecular engineering and organics for electronics and optoelectronics
- Knowledge about molecular transport phenomena

# **Department of Chemical Engineering**

## **Few Programme Elective Courses**

- Unit Operations
- Petrochemical Engineering
- Introduction to Complex Fluids
- Waste Water Treatment
- Biochemical Engineering

#### **Complex Fluids and Interfacial Engineering**

- Understanding the physics of colloids and suspension
- Polymers and their application in traditional as well as advanced areas
- Theory of complex fluid, and supercooled fluids
- Time correlation function, stress-strain behavior, rouse theory, etc
- Analyze the behavior of viscoelastic materials and the structure-property relation of fluid

#### Biochemical Engineering

- Chemical engineering aspects of biology and biotechnology
- kinetics of enzyme catalysis, bioreactors, biochemical products
- The industrial importance of microorganisms, fermentation, microbial production of organic acids
- Design the reactors for biochemical engineering
- Systems and analyze the different aspects of separation processes

# **Department of Chemical Engineering**

# M. Tech, M. Tech-PhD Courses

- Advanced Transport Phenomena
- Advanced Reaction Engineering
- Advanced Chemical Engineering Thermodynamics
- Advanced Mathematical Methods in Chemical Engineering
- Advanced Process Control and AI Applications

## Advanced Transport Phenomena :

- Review of fluid kinematics
- Conservative principles and constitutive laws
- Coupled transport processes
- Turbulence modeling
- Multiple parameter estimation
- Transport phenomena in large and small scale systems

#### Advanced Chemical Engineering Thermodynamics :

- Review of classical thermodynamics
- Adsorption thermodynamics
- Chemical thermodynamics
- Statistical thermodynamics
- Modeling of ideal gasses and gas mixtures
- Modeling of crystals

- Advanced Wastewater Treatment
- Multi-component Separation Processes
- Advanced Mass Transfer
- Hydrogen and Methanol Economy
- Principles of Electrochemical Engineering

### Advanced Reaction Engineering :

- Introduction to advanced reactors
- Reaction stability analysis
- Non-Ideal reactors
- Gas-Solid and Liquid-Solid catalytic reactions
- Multiphase reactors, fluidized bed reactors
- Packed bed reactors

- Chemical Reactor Analysis
  Capillarity and Wetting
  Petroleum Refinery Engineering
- Packaging of Electronic Devices
- Computational Fluid Dynamics

### Advanced Process Control and AI Applications:

- Introduction to advanced process control; feedforward control
- Feed-forward control
- Al and IOT in control systems
- Al techniques in process monitoring,
- Fault detection, and diagnosis
- Real-time computer control of process equipment

### Advanced Mathematical Methods:

- Introduction to vector space matrix
- Contraction mapping
- Eigenvalue problems
- Partial differential equations
- Special ODEs and adjoint operators
- Solution of PDEs by different methods