

## HIGHER NITEC IN CHEMICAL PROCESS TECHNOLOGY (3 YEARS)

### CERTIFICATION

Credits required for certification:

Foundation Modules	: 24
Specialisation Modules	: 45
Life Skills Modules	: 10
Cross Disciplinary Core Modules	: 9
Electives	: 8
<b>Total</b>	<b>: 96</b>

### COURSE STRUCTURE

Module Title	Credits
<b>FOUNDATION MODULES</b>	
Basic Laboratory Techniques	3
Occupational Health & Safety	3
Applied Science Fundamentals	3
Basic Mathematics	3
Analytical Laboratory Techniques	3
Good Industry Practices	3
Basic Microbiology Techniques	3
Urban Farming Laboratory Techniques	3
<b>SPECIALISATION MODULES</b>	
Process Instrumentation	3
Process Operations	3
Fluid Flow & Equipment Operations	3
Upstream Bioprocess Operations	3
Cleanroom Operations & Practices	3
Pharmaceutical Operations	3
Separation & Transfer Processes	3
Product Quality Testing	3
Simulated Control Panel Operations	3
Downstream Bioprocess Operations	3
Material & Energy Balances	3
Industry Attachment 1	4
Industry Attachment 2	8
<b>CROSS DISCIPLINARY CORE MODULES</b>	
Emergency Response Management	3
Data & Statistical Analytics	3
<b>ELECTIVES (COURSE SPECIFIC)</b>	
Wastewater Treatment & Control	2
Process Gas Chromatography	2
Equipment Maintenance	2
Plant Utilities	2

Module Title	Credits
<b>LIFE SKILLS MODULES</b>	
For details, click <a href="#">here</a>	3

*Note: The offer of electives is subject to the training schedule of respective ITE Colleges. Students are advised to check with their Class Advisors on the availability of the elective modules they intend to pursue.*

## MODULE OBJECTIVES

### Foundation Modules

#### Basic Laboratory Techniques

On completion of the module, students should be able to perform manual titration, as well as identify the common elements of organic molecules, nomenclature used, chemical structure and bonding, common functional groups, and the properties associated with the various functional groups of organic compounds.

#### Occupational Health & Safety

On completion of this module, students should be able to perform workplace housekeeping and maintain workplace safety, which includes process safety, handle hazardous materials, perform biohazard waste management as well as participate in risk assessment.

#### Applied Science Fundamentals

On completion of this module, students should be able to identify common elements of organic and inorganic molecules, nomenclature used, chemical structure and bonding, common functional groups as well as the properties associated with the various functional groups. Students should also be able to perform basic measurements, prepare stock solution and do simple dilution in the laboratory.

#### Basic Mathematics

On completion of this module, students should be able to apply the various mathematical principles such as algebra, perform unit conversion and construct graphs for laboratory data expression and analysis. In addition, they should be able to collate data and perform basic functions using common software programme.

#### Analytical Laboratory Techniques

On completion of this module, students should be able to carry out basic calibration for analytical instruments, and perform basic measurements using these analytical instruments for sample analysis.

#### Good Industry Practices

On completion of this module, students should be able to explain the importance of various industry and regulatory standards, interpret basic regulatory guidelines and adhere to good laboratory and manufacturing practices.

#### Basic Microbiology Techniques

On completion of this module, students should be able to acquire the fundamental knowledge of microbiology and perform basic microbiological techniques required for the safe-handling, examination and cultivation of microorganisms.

#### Urban Farming Laboratory Techniques

On completion of this module, students should be able to perform quality testing on growth media (water, soil, compost, etc) for the aquaculture and agriculture industries.

### Specialisation Modules

#### Process Instrumentation

On completion of the module, students should be able to carry out control valve operation with hand-wheel, control valve by-pass operation, monitor process conditions, and perform instrument functionality check.

### Process Operations

On completion of the module, students should be able to load and unload material, perform inter-tank transfer and collection of raw material and sampling.

### Fluid Flow & Equipment Operations

On completion of the module, students should be able to line up the pipelines and valves, carry out pump, heat exchanger, mixer, furnace and compressor operations.

### Upstream Bioprocess Operations

On completion of the module, students should be able to perform process relating to the upstream processes in a biologics and pharmaceutical industry. Students would be able to perform seed and inoculum preparation activities, carry out bioreactor setup, perform bioreactor operations and carry out process monitoring operation.

### Cleanroom Operations & Practices

On completion of the module, students should be able to perform gowning for entry and handle materials in the cleanroom / controlled environment. They also be able to carry out plant turnaround and changeover activities.

### Pharmaceutical Operations

On completion of the module, students should be able to carry out isolator operation, reactor/vessel operations, phase separation and drying operation.

### Separation & Transfer Processes

On completion of the module, students should be able to carry out distillation operation, gas absorber and extraction unit operation.

### Product Quality Testing

On completion of the module, students should be able to perform instrumental analysis on petroleum and pharmaceutical products, in accordance to respective testing standards.

### Simulated Control Panel Operations

On completion of the module, students should be able to navigate through the simulated petroleum refining units, trace flows and locate equipment. They also learn to use the simulated gauges and panels to observe actual operating conditions and interact with the processes.

### Downstream Bioprocess Operations

On completion of the module, students should be able to perform process relating to the downstream processes in a biologics and pharmaceutical industry. Students would be able to perform cell disruption process, perform post fermentation purification processes. In addition, students would be able to perform product analysis and perform CIP and SIP operation.

### Material & Energy Balances

On completion of the module, students should be able to apply principles of chemical engineering to perform material and energy balances on common process unit.

### Industry Attachment

On completion of this module, students should be able to integrate and apply the skills and knowledge acquired at ITE College, and further develop competencies at the workplace.

## Cross Disciplinary Core Modules

### Emergency Response Management

On completion of the module, students should be able to respond to the various emergency situations, take appropriate actions in any emergency and support the emergency action plan.

### Data & Statistical Analytics

On completion of the module, students should be able to apply analytical skills in the use of data and statistical tools. It allows students and end-users to visualize data and share insights with the given dataset., or embed them in your app or website.

## **Electives (Course Specific)**

### **Wastewater Treatment & Control**

On completion of the module, students should be able to apply skills and knowledge in conducting tests on effluent waste, carrying out waste treatment process by commission and maintenance of sand filtration system.

### **Process Gas Chromatography**

On completion of the module, students should be able to apply skills and knowledge in to operate process gas chromatograph and conduct process gas chromatograph calibration. They also learn to conduct routine maintenance of the sampling system.

### **Equipment Maintenance**

On completion of the module, students should be able to prepare process equipment for maintenance, perform basic frontline maintenance, check and perform equipment health monitoring.

### **Plant Utilities**

On completion of the module, students should be able to carry out boiler unit operation, boiler feed water treatment, steam header and condensate unit operation. They also learn to monitor other plant utilities such as compressed air and cooling water system.

## **Life Skills Modules**

For details, click [here](#).