

## HIGHER NITEC IN BIO-CHEMICAL TECHNOLOGY (3 YEARS)

### CERTIFICATION

Credits required for certification:

Foundation Modules	: 24
Specialisation Modules	: 42
Life Skills Modules	: 10
Cross Disciplinary Core Modules	: 12
Elective Modules	: 8
<hr/> Total	<hr/> : 96

### 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>	
Introductory Chemistry	3
Analytical Chemistry	3
Laboratory Mathematics & Data Analysis	3
General Microbiology	3
Sample Handling & Processing	3
Essential Biochemistry	3
Spectroscopy Techniques	3
Liquid Chromatography Techniques	3
Gas Chromatography Techniques	3
Molecular Bioscience	3
Industry Attachment 1	4
Industry Attachment 2	8
<b>CROSS DISCIPLINARY CORE MODULES</b>	
Fundamental of Health & Wellness	3
Green Technology	3
Laboratory Management Automation	3
Quality Manufacturing Practices	3
<b>ELECTIVES (COURSE SPECIFIC)</b>	
Essentials in Environmental Science	2
Introduction to Cosmetic Science	2
Medical Laboratory Practice	2

Module Title	Credits
Molecular Biology Techniques	2
<b>LIFE SKILLS MODULES</b>	
For details, click <a href="#">here</a>	

*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 adhere to laboratory safety, maintain the quality standards of chemical laboratory, perform basic laboratory techniques, carry out basic calibration and organise laboratory data.

#### Occupational Health & Safety

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

### Specialisation Modules

#### Introductory Chemistry

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.

### Analytical Chemistry

On completion of the module, students should be able to perform measurement of pH and physical properties as well as various separation techniques for analysis using equipment.

### Laboratory Mathematics & Data Analysis

On completion of the module, students should be able to apply the various mathematical principles such as numbers, exponential and logarithms function and graphs construction for laboratory operations and analysis. They should also be able to collate data, prepare graphical display and perform statistical analysis using common software programme.

### General Microbiology

On completion of the module, students should be able to safely cultivate and stain microorganisms using aseptic techniques, perform microscopic observation of microorganisms and determine the concentration of cells in samples using common enumeration techniques.

### Sample Handling & Processing

On completion of the module, students should be able to understand sampling plans, perform sampling, apply proper preservation techniques and carry out sample analysis.

### Essential Biochemistry

On completion of the module, students should be able to perform analysis of biological compounds using various biochemical and spectrophotometric techniques as well as perform post-analysis interpretation of test results.

### Spectroscopy Techniques

On completion of the module, students should be able to perform various modes of spectroscopy, which include infrared spectrometry, atomic spectrometry, and the applications of inductive-coupled plasma instrument. They will also be able to troubleshoot and maintain spectroscopic instruments.

### Liquid Chromatography Techniques

On completion of the module, students should be able to perform chemical analysis with different types of High Performance Liquid Chromatography (HPLC) instruments, such as Reversed Phase HPLC, Ion Chromatography (IC), and Liquid Chromatography-Mass Spectrometry (LCMS). They will also be able to troubleshoot and conduct basic routine maintenance for liquid chromatographic instruments.

### Gas Chromatography Techniques

On completion of the module, students should be able to perform chemical analysis with different types of Gas Chromatography (GC) instruments such as GC- Flame Ionization Detector (FID), GC-Thermal Conductivity Detector (TCD) and GC-Mass Spectrometry (GCMS). They will also be able to troubleshoot and conduct basic routine maintenance for gas chromatographic instruments.

### Molecular Bioscience

On completion of the module, students should be able to perform various laboratory detection and diagnostic tests of biomolecules/ microorganisms for diagnostic/ identification purposes. They will also be able to classify and manage biological mixed waste.

### Industry Attachment

On completion of the 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

### Fundamental of Health & Wellness

On completion of the module, students should be able to describe the various aspects of health and body wellness as well as identify solutions for overall well-being.

### Green Technology

On completion of the module, students should be able to identify current global environmental issues and describe the green technology available to overcome these issues.

### Laboratory Management Automation

On completion of the module, students should be able to manage the laboratory activities, monitor usage of equipment and assumptions, maintain and process analytical results with Microsoft Excel.

### Quality Manufacturing Practices

On completion of the module, students should be able to adhere accordingly to manufacturing processes and procedures to produce quality products with proper documentation in well controlled environment in accordance to regulations.

### Electives (Course Specific)

#### Essentials in Environmental Science

On completion of the module, students should be able to perform quality tests on environmental samples for the monitoring of environment and pollution in the manufacturing industries.

#### Introduction to Cosmetic Science

On completion of the module, students should be able to prepare simple cosmetic products using basic formulations as well as to perform stability tests to apply the safety concept of cosmetic evaluations based on international legislations.

#### Medical Laboratory Practice

On completion of the module, students should be able to perform basic preparative and analytical techniques which are relevant to a medical diagnostic laboratory.

#### Molecular Biology Techniques

On completion of this module, students should be able to perform basic DNA manipulation and analysis techniques including DNA extraction and gel electrophoresis.

### Life Skills Modules

For details, click [here](#).