छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

CHHATRAPATI SHAHU JI MAHRAJ UNIVERSITY, KANPUR

(पूर्ववर्ती कानपुर विश्वविद्यालय कानपुर)

Formerly Kanpur University, Kanpur – 208024

A Documentary Support

For

Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the

Criteria - I

(Curriculum Design and Development)

Key Indicator - 1.1

In

Matric No. – 1.1.1

M.Sc. Industrial Chemistry

Co-ordinator
Internal Quality Assurance Cell
CSJM University, Kanpur

(Registrar)
C.S.J.M.University
Kanpur

REGISTRAR
C.S.J.M. UNIVERSITY
KANPUR

Department of Chemistry

Vision and Mission of the department

Vision of the department is to provide excellent knowledge of the chemistry for under graduate as well as post graduate students. The department provide experimental knowledge to the students and prepare as a industry professional person with sound knowledge of instruments and chemical analysis.

To prepare the student as a good researcher, smart and skilled person,entrepreneur with ethical values as well as a quick problem solver.

To provide the knowledge of implementation and importance of chemistry in thefield of MSME, Electronics, CSE, Chemical Engineering and Mechanical Engineering.

Programme Educational Objectives

To provide sound knowledge of physical, organic, inorganic chemistry, analyticalchemistry and applied chemistry to the students.

To provide experimental knowledge and easy handling of lab work.

To provide the knowledge of research and methodology, analytical techniques, instrumentation and industrial processing along with chemistry involved in different industries like Oil and Paints , Polymers, Dyes, Natural products,Pharmaceutical , Perfumery , Soap detergents, Sugar and Pulp etc.

To explore the industrial knowledge through visits and training in variousindustries.

M.Sc. (Industrial Chemistry)

About the Programme

The programme of M.Sc.(Industrial Chemistry) of the Chemistry Department aims to attract the students with bachelor degree to grow and make careers as chemistry professional as well as researcher/ industry personals. It is a four semester programme with 15 theory papers which includes the knowledge of research and methodology, analytical techniques, instrumentation and industrial processing along with chemistry involved in different industries like Oil and Paints , Polymers, Dyes, Natural products, Pharmaceutical, Perfumery, Soap detergents, Sugar and Pulp etc. The course also includes two Lab components and two industrial training in various industries during the programme. After completing the M.Sc. programme students are well trained for doing a variety of jobs in the industry and in research area.

Course Outline

Semester-I

i) MSIC-101 (Analytical techniques part –A)

ii) MSIC-102 (Research Methodology, Statistical techniques and computer applications)

iii) MSIC-103 (Organic Chemistry)

iv) MSIC-104 (Physical Chemistry)

v) MSIC-105 (Lab course – I)

Semester-II

vi) MSIC-201(Polymer Chemistry)

vii) MSIC-202 (Chemistry of materials, Petrochemicals and Fertilizers)

viii) MSIC-203 (Analytical techniques part –B)

ix) MSIC-204 (Environmental Chemistry and waste water management)

x) MSIC-205 (Industrial training and seminar part-A)

Semester -III

xi) MSIC-301 (Natural products, Cosmetics and perfumery)

xii) MSIC-302 (Pharmaceutical Chemistry)

xiii) MSIC- 303 (Sugar and Pulp chemistry)

xiv) MSIC-304 (Essential oils, Dyes and Paints)

xv) MSIC-305 (Lab Course -II)

Semester- IV

xvi) MSIC-401 (Environmental Impact Assessment)

xvii) MSIC-402 (Food science and Agrochemicals)

xviii) MSIC-403 (Chemistry of life)

xix) MSIC-404 (Industrial training and seminar part-B)

M.Sc. Industrial Chemistry

Programme outcome

PO1. Fundamental Knowledge of Basic principles

PO2. Applications of Various Aspect of Chemistry to Different Industries PO3. Communication of Scientific Information in a clear and Concise MannerPO4. Explain Environment Pollution Issues and remedies

PO5. To Develop the Sustainable and eco-friendly TechnologyPO6. Knowledge and handling of Equipment

PO7. Hands on Experiment

PO8. Inculcate Logical Thinking to address the Problem with SolutionPO9. Individual and team work

Programme Specific Outcome

PSO1. Exposure to various industries

PSO2. Knowledge to Build up Small scale industry

Course Outcome

Semester-I

MSIC-101 Analytical Techniques Part –I

After successfully completion of this course student will be able to

a. Purification, separation and identification of compounds need specialtechniques.
b. Knowledge of solvent extraction,
c. Basics and application of electron microscopies like SEM and TEM
d. Separation of mixtures using different chromatographic Techniques.

MSIC-102 Research methodologies

After successfully completion of this course student will be able to

a. Identify and discuss the issues.
b. Concepts salient to the research process
c. The concept of data collection analysis
d. Reporting, selecting an appropriate research design and implementing researchproject.
e. To apply parametric and non-parametric Tests

MSIC-103 Organic Chemistry

After successfully completion of this course student will be able to

a. Learn the different types of heterocyclic molecule and their chemistry andbiological property.
b. Learn modern synthetic methods for the preparation of heterocycliccompound and their structural elucidation.
c. Learn the properties & side effects of different heterocyclic compounds.
d. Learn the basic photochemistry & different types of photochemical reaction.
e. Learn the different types of organometallic compounds and their uses inorganic synthesis.
f. Learn the different types rearrangement reaction in organic synthesis.

MSIC-104 Physical Chemistry

After completing this course student will be able to

a. Understand concept of kinetics of reaction and theories related to it.
b. Gain knowledge about rate of reaction , chain reactions , catalysis and enzymekinetics
c. Concept of electrochemistry and electrochemical reactions
d. Mechanism related to corrosion and corrosion preventive methods
e. Concept of Colloidal chemistry, surface chemistry and their variousapplications

MSIC-105 Lab Course –I

After completing the lab course students will be able to

a. Able to determine the hardness, alkalinity/acidity and inorganic ions in water
b. Purification and distillation of water
c. Chromatographic separations by TLC, Paper and Column
d. Conduct metric titrations and CMC determination using Conductivity meter
e. Physical parameter determination Like pH, Viscosity, Optical activity,Melting Point etc. using various equipment

Semester-II

MSIC-201 Polymer Chemistry

Students will be able to understand

a. The basics and different kind of polymers with their properties.
b. The concept of molecular weight and distribution
c. Difference between crystalline melting temperature and glass transitiontemperature with variation in properties of polymers.
d. The effect of factors such as polymer structure, molecular weight, branchingand diluents on crystallinity, mechanical properties.
e. Techniques of polymer processing

MSIC-202 Chemistry of Materials, Petrochemicals and Fertilizers

Students will be able to understand

a. The chemical composition of cement, ceramics and glass and theirindustrial applications.

b. Learn the chemistry of magnetic materials and nano-materials and their new-age applications

c. Understand the chemical composition of fertilizers and their application to society/agriculture.

d. Understand the chemical composition of natural gas, crude petroleum, andlubricants and their application to daily life.

MSIC-203 Analytical Techniques Part – B

Students gain the knowledge about the

a. Basic concepts of IR, UV-Visible, NMR and Mass Spectroscopy
b. Apply the learned concept of IR, UV-Visible, NMR and Mass Spectroscopyin various fields
c. Concept behind the Polarography and its application in analysis of variouskinds of organic, inorganic and biological materials
d. The principal, Basic concept and application of Electron Spin Resonance Spectroscopy in various areas

e. Bragg's law, its relation to crystal structure , different methods on interpretation and application in various fields

MSIC-204 Environmental Chemistry and Wastewater Management

Students will gain the knowledge

a. about the environmental science, biodiversity and ecosystem.
b. Conventional and non-conventional energy resource, global warming,ozone layer depletion, water pollution and air pollution
c. BOD, COD, DO, TDS, concept of hard water and soft water.
d. Fundamentals of unit operations for waste water treatment and disinfection.
e. Advanced treatment operations, reverse osmosis, electro dialysis and ionexchange method

MSIC-205 Industrial Training Part A

a. To provide comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with real corporate exposure.
b. To enhance knowledge in one particular technology.
c. To provide learners hands on practice within a real job situation.
d. Ability to communicate efficiently.

Semester-III

MSIC-301 Natural Products, Cosmetics and Perfumery

Students gain the knowledge about the

a. Learn the different types of alkaloids, terpenes & terpenoids etc. and theirchemistry and biological importance and as lead molecules for new drug discovery
b. Learn the constituent present in natural products responsible for anti-diabetic, anti-malarial, activity.
c. Learn the constituent present in natural products used as pain killer, localanaesthetic, violent poison etc.
d. Learn advanced methods of structural elucidation of compounds of naturalorigin.
e. Understand isolation, purification and characterization of chemical constituents from the natural source.

MSIC-302 Pharmaceutical Chemistry

Student will learn about the

a. fundamentals of Pharmaceutical Chemistry, structure and characteristics ofdrug
b. Pharmacokinetics , Pharmacodynamics, Natural and synthetic lead compounds
c. Structure –Activity Relationship and drug design
d. Synthesis of Antibiotics and knowledge of some important drug categories
e. Strategies in design of anticancer , anti- HIV drugs and drug deliverysystem

MSIC-303 Sugar and Pulp Chemistry

On the completion of this course student will be able to understand

a. The basic chemistry of sugars and concepts of sugar industry
a. The techniques used for the sugar manufacturing like, extraction, clarification, and concentration of sugarcane juice
b. Sugar extraction from alternate sources like sugarbeet
c. Industrial application of fermentation like production of alcohol fromdifferent sources
d. Basics of pulp and paper chemistry

MSIC-304 Essential oils, dyes and Paints

After completion of this course the student will be able to understand

a. Source and Chemistry of Essential oils
b. Various techniques used for the extraction of EOs, recognizing physical andchemical properties
c. Uses of Essential oils in various industries
d. Basic concepts, composition and classification of dyes, process of dyeingand its application
e. Basic concept of paints, composition, classification , properties and applications in various fields

MSIC-305 Lab Course-II

After completion of this course the student will be able to understand

a. Isolation of different compounds(Caffeine and Lycopene) from plants
b. Estimation of Casein , acidity of provided fruit, identification of DNA,acetic acid in vinegar
c. Able to determine the acid value of oil, argemone oil in mustard oil, non-volatile extract of spices, salt % in curry powder
d. Enzyme catalysis using UV-Visible spectrophotometer, CO2 determinationin water sample
e. Physical parameter determination such as density Surface tension etc. withthe help of various equipment

Semester-IV

MSIC-401 Environmental Impact Assessment

Student will be able to explain

a. The concepts of Environment Impact Assessment (EIA),
b. Environment law, aim and concept,
c. Necessity of EIA
d. Important plant or animal groups and preparation of EIA reports.
e. Methodologies used for EIA

MSIC-402 Food Technology and Agrochemicals

Student will be able understand

a. Nutrients of food like Proteins, carbohydrates, fats etc.
b. Structure, sources and importance of vitamins, minerals, pigments and flavorin food
c. Cause and prevention of food born bacterial diseases
d. Knowledge of food additives and food preservation
e. Importance, classification , mode of action, structure and properties of agrochemicals

MSIC-403 chemistry of life

Student will be able understand and explain the

a. Basic concept related to cell biology. Describe biomolecules and theirfunctions
b. Concepts of nuclei acid, synthesis, transmission and expressing hereditaryinformation
c. Proteins, its synthesis and their function
d. Understand the nature of lipids, assembly in membranes and applications
e. Knowledge related to enzymes, classification and their various applications

MSIC-404 Industrial Training Part B

a. To provide comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with realcorporate exposure.
b. To enhance students' knowledge in one particular technology.
c. To provide learners hands on practice within a real job situation.
d. Ability to communicate efficiently.