



**THIRD-YEAR OF BACHELOR OF SCIENCE
CHEMISTRY (MAJOR)
REVISED SYLLABUS ACCORDING TO CBCS
NEP2020**

**COURSE TITLE: CHEMISTRY-III
SEMESTER-V
W.E.F. 2025-2026**

**RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY
AND**

**APPROVED BY THE ACADEMIC COUNCIL
Devrukh Shikshan Prasarak Mandal's**

**Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India**

Academic Council Item No: 02/2025

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Chemistry
Name of the Class	:	Third Year
Semester	:	Fifth (V)
No. of Credits	:	02
Title of the Course	:	Chemistry-III
Course Code	:	S303CHT
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Third Year of B.Sc. Degree Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	5.5
Pattern of Marks Distribution for SEE and CIA	:	40:60%
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-V

Paper No.– III

Course Title: Chemistry-III

No. of Credits - 02

Type of Vertical: Major

COURSE CODE: S303CHT

Learning Outcomes Based on BLOOM's Taxonomy:

After Completing the Programme, Student will be able to,

Bloom Level	CO No.	Course Outcome
Remember	CO1	write the types and mechanism of reactions involving NGP, preparation and reactions of given heterocycles as well as explain the basic concepts of UV and Mass spectroscopy
Understand	CO2	understand the concept of Molecular chirality, IUPAC names for the given compounds
Apply	CO3	classify the Pericyclic reactions, types of reactions and understand the principals of green chemistry, natural products and give its preparation and reactions

Syllabus for Third Year of Bachelor of Science in Chemistry

(With effect from the academic year 2025-2026)

SEMESTER-V

Paper No.– III

Course Title: Chemistry-III

No. of Credits - 02

Type of Vertical: Major

COURSE CODE: S303CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	1.1- Organic Reaction Mechanism and Pericyclic Reactions (8 L) 1.1.1 Neighbouring group participation in nucleophilic substitution reactions: participation of lone pair of electrons, kinetics and stereochemical outcome. 1.1.2 Acyl nucleophilic substitution (Tetrahedral mechanism) 1.2 Pericyclic Reactions and Photochemistry 1.2.1 classification and nomenclature of reactions 1.2.2. Electro cyclic reactions (ring opening and ring closing), cycloaddition, sigma tropic Rearrangement, group transfer reactions, cheletropic reaction (definition and one example of each type) 1.2.3 Difference between thermal and photochemical reactions, Jablonski diagram 1.2.4 Photochemical reactions of olefins: photochemical rearrangement of 1,4- dienes (di- π methane), Photochemistry of carbonyl compounds: Norrish I, Norrish II cleavages. 1.3 Stereochemistry and Heterocyclic chemistry (7L) 1.3.1 Molecular chirality and elements of symmetry: Mirror plane symmetry, inversion centre, rotation-reflection (alternating) axis. 1.3.2. Chirality of compounds without a stereo genic centre: cummulenes, biphenyls 1.4 Heterocyclic chemistry 1.4.1 Reactivity of pyridine-N-oxide and quinoline 1.4.2 Preparation of pyridine-N-oxide and quinoline (Skraup synthesis) 1.4.3 Reactions of pyridine-N-oxide: halogenation, nitration and reaction with $\text{NaNH}_2/\text{liq. NH}_3$, $n\text{-BuLi}$. 1.4.4 Reactions of quinoline, reduction, nitration, halogenation and reaction with $\text{NaNH}_2/\text{liq. NH}_3$, $n\text{-BuLi}$.	01	15

2	2.1 IUPAC Nomenclature (3L) 2.1.1 IUPAC Systematic nomenclature of the following classes of compounds (including compounds up to two substituents/functional groups) 2.1.2 Bicyclic compounds – spiro, fused and bridged (up to 11 carbon atoms)– saturated and unsaturated compounds. 2.1.3 Biphenyls 2.2 Synthesis of organic compounds (4L) 2.2.1. Introduction: Linear and convergent synthesis, criteria for an ideal synthesis, concept of chemo selectivity and regioselectivity with examples, 2.2.2 Multicomponent Synthesis: Mannich reaction and Biginelli reaction. Synthesis with examples (no mechanism) 2.2.3 Green chemistry: Introduction- Twelve principles of green chemistry. 2.3 Spectroscopy-I (5L) 2.3.1 Introduction: Electromagnetic spectrum, units of wavelength and frequency 2.3.2 UV–Visible spectroscopy: Basic theory, solvents, nature of UV-Visible spectrum, concept of chromophore, auxochrome, bathochromic and hypsochromic shifts, hyperchromic and hypochromic shifts, chromophore-chromophore and chromophore-auxochrome interactions. 2.3.3 Mass spectrometry: Basic theory. Nature of mass spectrum. General rules of fragmentation. Importance of molecular ion peak, isotopic peaks, base peak, nitrogen rule, rule of 13 for determination of empirical formula and molecular formula. Fragmentation of simple molecules. 2.4 Natural Products (3L) 2.4.1 Terpenoids: Introduction, Isoprene rule, special isoprene rule and the gem-dialkyl rule. 2.4.2 Alkaloids Introduction and occurrence. Hofmann's exhaustive methylation and degradation. Synthesis of nicotine from nicotinic acid, Harmful effects of nicotine.	01	15
	Total	02	30

Access to the Course

The course is available for all the students admitted for Third Year Bachelor of Science.

Methods of Assessment

The assessment pattern would be 40:60, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

References:

1. Organic Chemistry, Francis A Carey, Pearson Education, 6th Edition, Special Indian Edition 2008.
2. Organic Chemistry, R.T. Morrison and R.N. Boyd, 6th Edition, Pearson Edition.
3. Organic Chemistry, T.W.G. Solomon and C.B. Fryhle, 8th Edition, John Wiley & Sons, 2004.
4. Organic Chemistry Paula Y. Bruice, Pearson Edition, 2008.
5. Organic Chemistry, J.G. Smith, 2nd Edition Special Indian Edition, Tata. McGraw Hill.
6. Stereochemistry, P.S. Kalsi, New Age International Ltd. 4th Edition, 2006
7. Organic Spectroscopy by Jag Mohan
8. Organic Spectroscopy by P.S. Kalsi, New Age International Ltd.
9. Furniss, B. S.; Hannaford, A. J.; Rogers, V.; Smith, P. W. G.; Tatchell, A. R. Vogel's Textbook of Practical Organic Chemistry, ELBS.
10. Organic Chemistry of Natural Products, Gurdeep Chatwal, Vol. 3, Himalaya Publication
11. Heterocyclic Chemistry, Raj K. Bansal, 7th edition, New Age International
12. Heterocyclic Chemistry, V. K. Ahluwalia, Narosa Publishing House
