SECOND-YEAR OF BACHELOR OF SCIENCE CHEMISTRY (MAJOR AND MINOR) REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: CHEMISTRY-II
SEMESTER-III
W.E.F. 2024-2025

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:

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	:	Second Year
Semester	:	Third
No. of Credits	:	02
Title of the Course	:	Chemistry-II
Course Code	:	S202CHT
Name of the Vertical in adherence to NEP 2020	:	Major and Minor
Eligibility for Admission	:	Any student admitted to Second 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	:	UG
Pattern of Marks Distribution for SEE and CIA	:	40:60
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024-2025
Ordinances /Regulations (if any)		

Syllabus for Second Year of Bachelor of Science in Chemistry

(With effect from the academic year 2024-2025)

SEMESTER-III **Paper No.– 2**

Course Title: Chemistry-II **No. of Credits - 02**

Type of Vertical: Major and Minor **COURSE CODE: S202CHT**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…		
Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	describe Zone-Refining and Czochralski pulling method for preparation of ultrapure silicon and germanium.
CLO-02	Understand	explain types of Complex Chemical reactions, structure and bonding in diborane and tetraborane and write mechanisms of condensation reactions.
CLO-03	Apply	compare Collision Theory with Activated Complex Theory, ideal and non-ideal solutions and apply IUPAC nomenclature rules to aldehydes and ketones

Syllabus for Second Year of Bachelor of Science in Chemistry

(With effect from the academic year 2024-2025)

SEMESTER-III **Paper No.– 2**

Course Title: Chemistry-II **No. of Credits - 02**

Type of Vertical: Major and Minor **COURSE CODE: S202CHT**

COURSE CONTENT			
Module No.	**Content**	**Credits**	**No. of Hours**
1	**1.1 Chemical Kinetics-II (5 hr)** 1.1.1 Types of Complex Chemical reactions: Reversible or opposing, consecutive and parallel reactions (No derivations, only examples expected), Thermal chain reactions: H. and Br. reaction. (Only steps involved, no kinetic expression expected). 1.1.2 Effect of temperature on the rate of reaction, Arrhenius equation, Concept of energy of activation (Ea). (Numericals expected). 1.1.3 Theories of reaction rates: Collision theory and activated complex theory of bimolecular reactions. Comparison between the two theories (Qualitative treatment only) **1.2 Solutions (5 hr)** 1.2.1 Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law–non-ideal solutions. Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions. Lever rule. Azeotropes. 1.2.2 Partial miscibility of liquids: Critical solution temperature 1.2.3 Nernst distribution law and its applications, solvent extraction. **1.3 Chemistry of Boron compounds (5 hr)** 1.3.1 Electron deficient compounds – BH_3, BF_3, BCl_3 with respect to Lewis acidity, conditions for back-bonding applications. 1.3.2 Preparation of simple boranes like diborane and tetraborane. 1.3.3 Structure and bonding in diborane and tetraborane (2e-3c bonds) 1.3.4 Synthesis of Borax.	01	15

2	**2.1 Carbonyl Compounds (10 hr)** 2.1.1 Nomenclature of aliphatic, alicyclic and aromatic carbonyl compounds. Structure, reactivity of aldehydes and ketones and methods of preparation; Oxidation of primary and secondary alcohols using PCC, hydration of alkynes, action of Grignard reagent on esters, Rosenmund reduction, Gattermann – Koch formylation and Friedel Craft acylation of arenes 2.1.2 Reactions of aldehydes and ketones with HCN, RMgX, alcohol, amine, phenyl hydrazine, 2,4-Dinitrophenyl hydrazine, LiAlH4 and NaBH4. 2.1.3 Mechanisms of following reactions: Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt and Cannizzaro reaction. 2.1.4 Active methylene compounds: Acetylacetone, ethyl acetoacetate, diethyl malonate. **2.2 Chemistry of Silicon and Germanium (5 hr)** 2.2.1 Silicon compounds: Occurrence, Structure and inertness of SiO_2 2.2.2 Preparation of structure of $SiCl_4$ 2.2.3 Occurrence and extraction of Germanium 2.2.4 Preparation of extra pure Silicon and Germanium	01	15
	Total	**02**	**30**

Access to the Course

The course is available for all the students admitted for Second 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. K.L. Kapoor, A Textbook of Physical Chemistry, Volume 5, 4th edition, McGraw Hill: Chemical Kinetics- Page No. 95-136, 144-161.
2. James E. House, Principles of Chemical Kinetics, 2nd edition, Elsevier (2007): Chemical Kinetics- Page No. 1-26, 45-63.
3. D. N. Bajpai, Advanced Physical Chemistry (2010): Chemical Kinetics- Page No.424-450.
4. Santosh K. Upadhyay, Chemical Kinetics & Reaction Dynamics, Springer (2006): Chemical Kinetics- Page No. 46-52, 55-75.; Solutions- Page No. 185-202.
5. Whittaker, Mount & Heal, Physical Chemistry, BIOS Scientific Publishers Limited (2000): Solutions- Page No. 91-117.
6. Shriver & Atkins', Inorganic Chemistry, 5th edition (2013): Chemistry of Boron Compounds- Page No. 325-349; Chemistry of Silicon & Germanium- Page No. 350-371.
7. Rayner-Canham & Overton, Descriptive Inorganic Chemistry, 6th edition, W. H. Freeman and Company (2014): Chemistry of Boron Compounds- Page No. 311-321; Chemistry of Silicon- Page No. 358-367.
8. Bahl and Bahl, A Textbook of Organic Chemistry, S. Chand Publication (2014): Carbonyl Compounds- Page No. 387-425.
9. Clayden, Greevs, Warren & Wothers, Organic Chemistry, 2nd edition, Oxford University Press (2012): Carbonyl Compounds- Page No. 125-138.