

PO & PSO, CO & PO Mapping

Department of Chemistry

Surendranath College

**For CBCS System
Undergraduate Course
Under the affiliating
university**

Calcutta University

General Graduate Attributes
Program Outcomes (Generalized)
(As per UGC norms 2020 & 2022)

Serial Number	Program Outcome	Program Outcome Attribute
1	PO-1	Critical thinking
2	PO-2	Creativity
3	PO-3	Communication Skills
4	PO-4	Analytical reasoning/thinking
5	PO-5	Research-related skills
6	PO-6	Coordinating/collaborating with others:
7	PO-7	Leadership readiness/qualities
8	PO-8	Learning how to learn skills
9	PO-9	Digital and technological skills
10	PO-10	Multicultural competence and inclusive spirit
11	PO-11	Value inculcation
12	PO-12	Autonomy, responsibility, and accountability
13	PO-13	Environmental awareness and action
14	PO-14	Community engagement and service
15	PO-15	Empathy

Relevant Program Outcomes (Chemistry)

(As per UGC norms 2020 & 2022)

Serial Number	Program Outcome	Program Outcome Attribute
1	PO-1	Critical thinking
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8	PO-8	Learning how to learn skills
9	PO-9	Digital and technological skills
10	PO-13	Environmental awareness and action
11	PO-15	Empathy

Program Specific Outcomes Nos	Program Specific Outcomes (PSO)
PSO 1	Apply knowledge in emerging and varied areas of Chemistry for higher studies, research, and industry and to be acquainted with state-of the art techniques &technologies
PSO 2	To develop leadership and managerial skills promoting the need for lifelong learning as required for a competent professional
PSO 3	To develop a neat experimental hand in conformity with good laboratory practices including safety measures

Surendranath College
Department of Chemistry
Undergraduate Course Module

Model Reference: University of Calcutta, Syllabus for Honours (CBCS)

Mapping of PO & PSO for Chemistry Hons Syllabus of University of Calcutta

Program Specific Outcomes (PSO) Nos	PROGRAM OUTCOMES (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO13	PO15
PSO 1	✓	✓	✓	✓	✓			✓		✓	✓
PSO 2			✓	✓	✓	✓	✓				✓
PSO 3		✓	✓	✓	✓	✓	✓	✓		✓	✓

Mapping of CO with PO for Chemistry Hons (CBCS) Syllabus of University of Calcutta

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)									
Physical Chemistry-1	CEMA- CC-1-2-Th	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13 PO 15
	Kinetic Theory & Gaseous State	✓	✓	✓	✓				✓		✓
	Transport Processes	✓	✓	✓	✓				✓		✓
	Chemical Kinetics	✓	✓	✓	✓				✓		✓
	CEMA-CC-1-2-P										
	Physical Chemistry Practical			✓			✓	✓	✓		✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)									
Inorganic Chemistry- 1	CEMA-CC-1-1-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13 PO 15
	Extra nuclear Structure of atom	✓	✓		✓				✓		✓
	Acid-Base reactions	✓	✓		✓				✓		✓
	Redox reactions	✓	✓		✓				✓		✓
	CEMA-CC-1-1-P										
	Inorganic Chemistry Practical			✓			✓	✓	✓		✓

(SEMESTER-2)**NO CORE COURSE MODULE IN PHYSICAL CHEMISTRY**

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Organic Chemistry - 2	CEMA – CC-2-3-TH	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Stereochemistry II	✓	✓		✓				✓			✓
	Treatment of Reaction Mechanism III	✓	✓		✓				✓			✓
	Substitution and Elimination Reactions	✓	✓		✓				✓			✓
	CEMA – CC-2-3-P			✓			✓	✓	✓			✓
	Organic Preparations											

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Organic Chemistry - 2	CEMA-CC-2-4-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Chemical Bonding-I	✓	✓		✓				✓			✓
	Chemical Bonding-II	✓	✓		✓				✓			✓
	Radioactivity	✓	✓		✓				✓			✓
	CEMA-CC-2-4-P											
	Inorganic Practical			✓			✓	✓	✓			✓

(SEMESTER-3)

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Physical Chemistry-2	CEMA-CC-3-5-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Chemical Thermodynamics 1	✓	✓		✓				✓			✓
	Chemical Thermodynamics-1I	✓	✓		✓				✓			✓
	Systems of Variable Composition	✓	✓		✓				✓			✓
	Electrochemistry	✓	✓		✓				✓			✓
	CEMA-CC-3-5-P											
	Physical Chemistry Practical			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Organic Chemistry- 3	CEMA -CC- 3-7-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Chemistry of Alkenes and Alkynes	✓	✓		✓				✓			✓
	Aromatic Substitution	✓	✓		✓				✓			✓
	Carbonyl and Related Compounds	✓	✓		✓				✓			✓
	Organometallics	✓	✓		✓				✓			✓
	CEMA-CC-3-5-P											
	Identification of a Pure Organic Compounds & Quantitative Estimations			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Inorganic Chemistry-3	CEMA-CC-3-6-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Chemical periodicity Chemistry of s and p Block Elements	✓	✓		✓				✓			✓
	Noble Gases	✓	✓		✓				✓			✓
	Inorganic Polymers	✓	✓		✓				✓			✓
	Coordination Chemistry-I	✓	✓		✓				✓			✓
	CEMA-CC-3-6-P											
	1) Complexometric titration 2) Chromatography of metal ions 3) Gravimetry			✓			✓	✓	✓			✓

COURSE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
SEC - A	Mathematics and Statistics for Chemists											
	Functions, limits, derivative, physical significance	✓	✓		✓	✓			✓			✓
	Differential equations:	✓	✓		✓	✓			✓			✓
	Probability	✓	✓		✓	✓			✓			✓
	Vectors, matrices, and determinants	✓	✓		✓	✓			✓			✓
	Qualitative and quantitative aspects of analysis:	✓	✓		✓	✓			✓	✓		✓
	Analysis and Presentation of Data:	✓	✓		✓	✓			✓	✓		✓

COURSE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
SEC-A	Analytical Clinical Biochemistry											
	Carbohydrates:	✓		✓		✓			✓			✓
	Proteins	✓		✓		✓			✓			✓
	Enzymes	✓		✓		✓			✓			✓
	Lipids	✓		✓		✓			✓			✓
	Lipoproteins	✓		✓		✓			✓			✓
	RNA	✓		✓		✓			✓			✓
	Biochemistry of disease	✓		✓		✓			✓			✓
	Blood	✓		✓		✓			✓			✓
	Urine	✓		✓		✓			✓			✓

(SEMESTER-3)

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Physical Chemistry-3	CEMA- CC-4-9-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Application of Thermodynamics-II	✓	✓		✓				✓			✓
	Foundation of Quantum Mechanics	✓	✓		✓				✓			✓
	Crystal Structure	✓	✓		✓				✓			✓
	CEMA-CC-4-9-P											
	Physical Chemistry Practical			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Organic Chemistry -4	CEMA – CC-4-8- TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Nitrogen Compounds	✓	✓		✓				✓			✓
	Rearrangements	✓	✓		✓				✓			✓
	The Logic of Organic Synthesis	✓	✓		✓				✓			✓
	Organic Spectroscopy	✓	✓		✓				✓			✓
	CEMA – CC-4-8-P											
	Qualitative Analysis of Single solid Organic Compounds			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Inorganic Chemistry- 4	CEMA-CC-4-10-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Coordination Chemistry-II Chemistry of d- and f- block elements Transition Elements Lanthanoids and Actinoids	✓	✓		✓				✓			✓
	Reaction Kinetics and Mechanism	✓	✓		✓				✓			✓
	CEMA-CC-4-10-P											
	1. Inorganic preparations 2. Instrumental Techniques			✓		✓	✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
	PHARMACEUTICALS CHEMISTRY	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
SEC- B	Drug discovery	✓		✓	✓	✓			✓	✓	✓	✓
	Pharmaceuticals	✓		✓	✓	✓			✓	✓	✓	✓
	Antibacterial andAntifungal agents	✓		✓	✓	✓			✓	✓	✓	✓
	Central Nervous Systemagents	✓		✓	✓	✓			✓	✓	✓	✓
	Cardiovascular	✓		✓	✓	✓			✓	✓	✓	✓
	HIV-AIDS related drugs	✓		✓	✓	✓			✓	✓	✓	✓
	Fermentation	✓		✓	✓	✓			✓	✓	✓	✓
	Antibiotics	✓		✓	✓	✓			✓	✓	✓	✓
	Vitamin	✓		✓	✓	✓			✓	✓	✓	✓

(SEMESTER-5)

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Physical Chemistry-4	CEMA-CC-5- 11-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Quantum Chemistry II	✓	✓		✓				✓			✓
	Statistical thermodynamics	✓	✓		✓				✓			✓
	Numerical Analysis	✓	✓		✓				✓			✓
	CEMA-CC-5-11-P											
	Physical Chemistry Practical: Computer programs based on numerical methods			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Organic Chemistry- 5	CEMA -CC- 5-12-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Carbocycles andHeterocycles	✓	✓		✓				✓			✓
	Cyclic Stereochemistry	✓	✓		✓				✓			✓
	Pericyclic Reactions	✓	✓		✓				✓			✓
	Carbohydrates	✓	✓		✓				✓			✓
	Biomolecules	✓	✓		✓				✓			✓
	CEMA -CC- 5-12-P											
	Chromatographic Separations			✓			✓	✓	✓			✓
	Spectroscopic Analysisof Organic Compounds			✓		✓	✓	✓	✓	✓		✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
DSE-A2	Applications of Computers in Chemistry (Theory)	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Computer Programming Basics (FORTRAN):		✓		✓		✓	✓	✓	✓		✓
	Introduction to Spreadsheet Software (MS Excel)		✓		✓		✓	✓	✓	✓		✓
	Statistical Analysis:		✓		✓		✓	✓	✓	✓		✓
	DSE-A-2-P											
	Applications of Computers in Chemistry		✓		✓		✓	✓	✓	✓		✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
DSE-B-1	Inorganic Materials of Industrial Importance (Th)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Silicate Industries- <i>Glass, Ceramics, Cements</i>	✓	✓			✓	✓	✓			✓	✓
	Fertilizers	✓	✓			✓	✓	✓			✓	✓
	Surface Coatings	✓	✓			✓	✓	✓			✓	✓
	Batteries	✓	✓			✓	✓	✓			✓	✓
	Alloys	✓	✓			✓	✓	✓			✓	✓
	Catalysis	✓	✓			✓	✓	✓			✓	✓
	Chemical explosives	✓	✓			✓	✓	✓			✓	✓
	Practical-DSE B-1: Inorganic Materials of Industrial Importance	✓	✓			✓	✓	✓			✓	✓

(SEMESTER-6)

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Inorganic Chemistry-5	CEMA-CC-6-13-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Theoretical Principles in Qualitative Analysis	✓	✓		✓				✓			✓
	Bioinorganic Chemistry	✓	✓		✓				✓			✓
	Organometallic Chemistry	✓	✓		✓				✓			✓
	Catalysis by Organometallic Compounds	✓	✓		✓				✓			✓
	CEMA-CC-6-13-P											
	Qualitative semimicro analysis of mixtures containing not more than three radicals.			✓			✓	✓	✓			✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Physical Chemistry-5	CEMA-CC-6-14-TH	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Molecular Spectroscopy	✓	✓		✓				✓			✓
	Photochemistry & Th of Reaction rate	✓	✓		✓				✓			✓
	Surface Phenomenon	✓	✓		✓				✓			✓
	CEMA-CC-6-14-P											
	Physical Chemistry Practical			✓			✓	✓	✓	✓		✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
DSE-A3	Green Chemistry and Chemistry of Natural Products	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Introduction to Green Chemistry	✓	✓		✓	✓	✓				✓	✓
	Principles of Green Chemistry and Designing a Chemical synthesis	✓	✓		✓	✓	✓				✓	✓
	Examples of Green Synthesis/ Reactions and some real-world cases	✓	✓		✓	✓	✓				✓	✓
	Future Trends in Green Chemistry	✓	✓		✓	✓	✓				✓	✓
	Alkaloids	✓	✓		✓	✓	✓				✓	✓
	Terpenes	✓	✓		✓	✓	✓				✓	✓
	DSE-A-3 Practical	✓	✓		✓	✓	✓	✓			✓	✓

PO & PSO, CO & PO Mapping

Department of Chemistry

Surendranath College

**For NEP System
Undergraduate Four- and
Three-Year Courses
under the affiliating
university**

University of Calcutta

Mapping of CO with PO for Chemistry Major, Minor and MDC (NEP) Syllabus of University of Calcutta

(Under UGC Curriculum & Credit framework, 2022)

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO15
Fundamentals of Chemistry - I	CHEM-H-CC1-1-Th											
	Module I Extra nuclear structure of atoms and Periodicity	✓	✓		✓				✓			✓
	Module II Basics of Organic Chemistry Bonding and Physical Properties Stereochemistry – I:	✓	✓		✓				✓			✓
	Module III Thermodynamics -I Chemical Kinetics-I	✓	✓		✓				✓			✓
	CHEM-H-CC1-1-P			✓			✓	✓	✓			✓
	Acid-Base Titrations: Oxidation-Reduction Titrimetric											✓

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
		PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO13	PO15
Interdisciplinary Course (IDC)	CHEM-MD-IDC-Th and CHEM-H-IDC3-3-Th: CHEM-MD-SEC-Th CHEMISTRY IN DAILY LIFE											
	Module I: Dairy Products, Food additives, adulterants, and contaminants, Artificial food colorants	✓	✓		✓				✓			✓
	Module: II Vitamins, Oils and fats, Soaps & Detergents	✓	✓		✓				✓			✓
	Module: III Chemical and Renewable Energy Sources, Polymers	✓	✓		✓				✓			✓
	CHEM-MD-IDC-Tutorial	✓			✓	✓	✓		✓	✓	✓	

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Interdisciplinary Course (IDC)	CHEM-H-IDC2-2-Th Quantitative Analysis and Basic Laboratory Practices	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO13	PO15
	Module: I Introduction to Quantitative analysis and its interdisciplinary nature:	✓	✓		✓				✓			✓
	Module: II Titrimetric analysis Gravimetric Analysis:	✓	✓		✓				✓			✓
	Module: III Water analysis Basic laboratory practices:	✓	✓		✓				✓			✓
	Tutorial: CHEM-H-SEC1-1-Tu	✓			✓	✓	✓			✓	✓	

COURSE MODULE	COURSE MODULE DETAIL	PROGRAM OUTCOMES (PO)										
Skill Enhancement Course Module Chemistry	CHEM-MD-SEC-Th	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 13	PO 15
	Module I: Dairy Products, Food additives, adulterants, and contaminants, Artificial food colorants		✓	✓	✓	✓			✓		✓	✓
	Module: II Vitamins, Oils and fats, Soaps & Detergents		✓	✓	✓	✓			✓		✓	✓
	Module: III Chemical and Renewable Energy Sources, Polymers		✓	✓	✓	✓			✓		✓	✓
	CHEM-MD-SEC-Tutorial				✓	✓	✓	✓		✓		