

Programme Template

1. Name of the Programme and Code	MSc. in Chemistry (CYS)
2. Degree (UG/PG)	PG
3. Minimum Duration of the Programme (Specify for FT and PT, if applicable)	FT: 4 semesters PT: NA
4. Maximum Duration of the Programme (Specify for FT and PT, if applicable)	FT: 6 semesters PT: NA Full-time converted to part-time: NA
5. Capacity (Max. Student Strength) of the Programme	68
6. Number of Regular Faculty Members Involved as Teaching Faculty in the Programme	All Chemistry Faculty (34)
7. Minimum Credit Requirements for the Degree	75
8. Articulate the Program Learning Outcomes (PLO) [For example, see: Objectives vs. Outcomes and Student Outcomes] The MSc graduates from the Department of Chemistry at IIT Delhi will PLO1. Explain fundamental and advanced knowledge concepts in chemical synthesis, characterization, analysis, and modelling. PLO2. Apply theoretical knowledge and experimental techniques to solve complex chemical problems, including designing and conducting experiments, analysing the data, and interpreting results. PLO3. Develop strong laboratory skills through practical and hands-on sessions in various courses. Apply state-of-the-art experimental and computational techniques in cutting-edge research areas across disciplines. PLO4. Exhibit professional and ethical responsibility in scientific practice and communication, with an awareness of the environmental and global impacts of chemical research and technology.	

9. Map PLOs with Institute Learning Outcomes (ILOs) of the Degree <i>[Indicate '1' for weak, '2' for good, and '3' for excellent relation. Leave the cell blank to indicate no relation]</i>				
	PLO1	PLO2	PLO3	PLO4
ILO1	3	3	3	1
ILO2	2	1	1	3
10. Number of Programme Core Credits			44 (36 lecture credits + 8 practical lab credits)	
11. Number of Programme Elective Credits			9 (9 lecture credits) An additional 9 lecture course credits for students not opting for the MAJOR CMD6041 project	
12. Number of Open Credits			6 (6 lecture credits)	
13. Number of Project Core Credits			16 (3 cornerstone project + 4 MINOR CMD6031 project credits + 9 MAJOR CMD6041 project) or 7 (3 cornerstone project + 4 MINOR CMD6031 project credits)	
14. Details of Creative Expression and Ethical Reasoning (CEER) Component in the Programme [Mandatory for UG]				
Number of Credits Assigned			0	
Courses Involved and Credits Accounted <i>[e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]</i>			MTPs	
15. Details of Emerging Trends (ETT) Component in the Programme [Mandatory for UG]				
Number of Credits Assigned			1	

Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	CML6032 and CML6031 courses have modules (hands-on) on materials modelling and design, structure-based drug design, and AI-driven computational approaches
16. Details of Environment and Sustainability (E&S) Component in the Programme [Mandatory]	
Number of Credits Assigned Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	2 CMP5011, CMP5012, CMP5021, and CMP5022
17. Details of Research/Technical Communication Component in the Programme [Only for PG]	
Number of Credits Assigned Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	16 Cornerstone Project (3 Credits) MINOR Project (4 Credits) MAJOR Project (9 Credits)
18. Details of Professional Ethics Component in the Programme [Only for PG]	
Number of Credits Assigned Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z</i>	1 Modules on ethics in data reporting and handling in the following courses: CMP5011, CMP5012, CMP5021,

credits, then write AMLXXX (Z credits)]		CMP5022, CMD6031 and CMD6041	
19. Details of External Connect Component in the Programme [Only for PG]			
Number of Credits Assigned		0	
Courses Involved and Credits Accounted [e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]			
20. List of prescribed courses in all baskets (BS, GE, DC/PC, DE/PE, ...)			
Basic Sciences (BS)	General Engineering (GE)	Departmental/Programme Core (DC/PC)	Departmental/ Programme Elective (DE/PE)
		CML5011 Quantum Chemistry & Spectroscopy (3-0-0) 3	List appended at the end
		CML5012 Stereo-chemistry & Organic Reaction Mechanisms (3-0-0) 3	
		CML5013 Physical Methods of Structure Determination of Organic Compounds (3-0-0) 3	
		CML5014 Main Group Chemistry (3-0-0) 3	
		CML5015 Instrumental and Computational Methods of Analysis (3-0-0) 3	
		CMP5011: Lab I	
		CMP5012: Lab II	

		CML5021: Molecular Thermodynamics and Reaction Dynamics (3-0-0) 3	
		CML5022 Organic Synthesis (3-0-0) 3	
		CML5023 Transition and Inner Transition Metal Chemistry (3-0-0) 3	
		CML5024 Basic Organometallic Chemistry (3-0-0) 3	
		CML5025 Structure & Function of Cellular Biomolecules (3-0-0) 3	
		CML6031 Molecular Biochemistry (3-0-0) 3	
		CML6032 Solid State Chemistry (2-0-2) 3	
		CMD6031 MINOR Project (0-0-8) 4	
		CMD6030 Cornerstone Project (0-0-6) 3	

21. Nominal Semester-wise Academic Plan *[An example is provided below]*

Semester	Course-1	Course-2	Course-3	Course-4	Course-5	Course-6	Course-7		L	T	P	C	NGUs	Contact hours
1	CML5011	CML5012	CML5013	CML5014	CML5015	CMP5011	CMP5012	PE I						
	Quantum Chemistry & Spectroscopy	Stereochemistry & Organic Reaction Mechanisms	Physical Methods of Structure Determination of Organic Compounds	Main Group Chemistry	Instrumental & Computational Methods of Analysis	Lab I	Lab II							
	3 0 0 3	3 0 0 3	3 0 0 3	3 0 0 3	3 0 0 3	0 0 4 2	0 0 4 2	3 0 3 3	15	0	4	19	0	23
2	CML5021	CML5022	CML5023	CML5024	CML5025	CMP5021	CMP5022	PE I						
	Molecular Thermodynamics & Reaction Dynamics	Organic Synthesis	Transition and Inner Transition Metal Chemistry	Basic Organometallic Chemistry	Structure & Function of Cellular Biomolecules	Lab III	Lab IV							
	3 0 0 3	3 0 0 3	3 0 0 3	3 0 0 3	3 0 0 3	0 0 4 2	0 0 4 2	3 0 0 3	18	0	4	22	0	26
3	CML6031	CML6032	PE II	OE I	CMD6031	CMD6030								
	Molecular Biochemistry	Solid State Chemistry			Minor Project	Cornerstone Project								
	3 0 0	2 0 2	3 0 0	3 0 0	0 0 8	0 0 6			15	0	4	19	0	27

	3	3	3	3	4	3									
4	PE III	CMD6041 or PE IV, PE V, & PE VI	OE II												
		Major Project / Program Elective Courses													
	3 0 0 3	0 0 18 9 9 0 0 9	3 0 0 3						6 1 5	0 0	9 0	15 15	0 0	24 15	

22. Average Contact Hours per Faculty <i>per Week</i> , for this Programme	$\left(\frac{23+26+27+24hrs.}{4Sem.} \right) \times \left(\frac{2Y}{34} \right) = 1.47$
23. Average Credit Students per Faculty per Semester, for this Programme	$\left(\frac{19+22+19+15credits}{4Sem.} \right) \times \left(\frac{2Y}{34} \right) = 1.10$
24. If the program is a revision of an existing program, please list the major changes made.	Yes (A) Two core courses, CML5021: Molecular thermodynamics and CML5022: Chemical dynamics and surface chemistry, have been combined into a single core course, CML5021: Molecular Thermodynamics and Reaction Dynamics. (B) We have introduced a new core course (without increasing the core course credits), CML6032 (2-0-2): Solid-State Chemistry, keeping the emerging trends in mind. (C) We have added modules on computational methods in the 'CML515: Instrumental Chemical Analysis' course and renamed it as 'CML5015: Instrumental and Computational Chemical Analysis'. (D) The students will be provided with a guided choice of PE courses from different area-specific baskets. (E) MAJOR project CMD6041 of 9 credits has been kept <i>as an option for</i>

	<i>students without CGPA restrictions.</i> Students not opting for this major project must register for program elective (PE) courses equivalent to 9 credits. (F) Considering the importance of spectroscopy for chemists, the course CML5013: Physical Methods of Structure Determination of Organic Compounds has been incorporated (without increasing the core credits) in place of Photochemistry and Pericyclic Reactions, which has now been converted to a PE (CML6074).
25. Please elaborate on,	
a) how flexibility for the students has increased?	The MAJOR Project has been made optional. Students can choose either the fourth semester MAJOR project of 9 credits or PE courses equivalent to 9 credits. Introduction of a program elective (PE I) in the second semester.
b) how engagement and interaction with the student have increased?	Additional practical hours in the CML6032 course and the cornerstone project CMD6030
c) how hands-on learning is emphasized in the program?	(A) Through state-of-the-art practical labs, research projects, and cornerstone teamwork (B) (i) Hands-on (practical) components, including AI/ML in CML6032 (2-0-2) (ii) Modules on computational approaches, including AI/ML in courses CML5015 and CML6031.

List of guided area-specific PE courses:

Organic Chemistry	Inorganic Chemistry	Physical Chemistry	Bio-Physical Chemistry/ Biochemistry
CML6071: Supramolecular Chemistry (3-0-3)	CML6081: Physical Methods in Inorganic Chemistry (3-0-3)	CML6062: Statistical Mechanics & Molecular Simulation Methods (3-0-3)	CML6065: Biophysical Chemistry (3-0-3)
CML6072: Recent Trends in Organic Chemistry (3-0-3)	CML6082: Inorganic Polymers (3-0-3)	CML6063: Selected Topics in Spectroscopy (3-0-3)	CML6091: Microbial Biochemistry (3-0-3)
CML6074: Photochemistry & Pericyclic Reactions (3-0-3)	CML6083: Applied Organometallic Chemistry (3-0-3)	CML6064: Group Theory & Spectroscopy (3-0-3)	CML6092: Food Chemistry and Biochemistry (3-0-3)
CML6075: Chemistry of Heterocyclic Compounds (3-0-3)	CML6084: Bio-Inorganic Chemistry (3-0-3)	CML7031: Chemical Separation and Electroanalytical Methods (3-0-3)	CML6095: Applied Biocatalysis (3-0-3)
CML6073: Bio-organic and Medicinal Chemistry (3-0-3)	CML7024: Synthesis of Industrially Important Inorganic Materials (3-0-3)	CML7234: Chemistry of Nanostructured Materials (3-0-3)	
CML7021: Design and Synthesis of Organic Molecules (3-0-3)	CML7033: Chemistry of Industrial Catalysts (3-0-3)	CML7012: Data analysis and cheminformatics (3-0-3)	
CML7023: Principles and practice of NMR and Optical Spectroscopy (3-0-3)	CML7038: Applications of P-block Elements and their Compounds (3-0-3)	CML7029: Material Characterization (3-0-3)	
CML7037: Applied Spectroscopy (3-0-3)	CML7041: Organo and organometallic catalysis (3-0-3)	CML8001: Molecular Modelling and Simulations: Concepts and Techniques (3-0-3)	
CML7042: Reagents in Synthetic Transformations (3-0-3)		CML7211: Machine Learning for Chemists	
CMD6041: Major project (0-0-18)			