

CURRICULUM & SYLLABUS



Bachelor of Science in Chemistry

or

Bachelor of Science (Hons.) Chemistry with Research/

Academic Projects

(A 4 Year Undergraduate Degree Program)

Under UGC Framework - 2022 based on NEP – 2020

(w.e.f. Academic Year 2023-24)

DEPARTMENT OF CHEMISTRY

FACULTY OF SCIENCE AND HUMANITIES

SRM UNIVERSITY DELHI-NCR, SONEPAT

Plot No.39, Rajiv Gandhi Education City

Sonepat Haryana-131029

Vision

The Department of Chemistry is committed to providing intellectual, innovative, and motivational surroundings to students and faculty members. The department is focused on contributing academic, scientific, research, and experimental knowledge through excellence and producing scientists, researchers, and bureaucrats. The department wants to strive and achieve the reputation of seeking the attention of the government of India and the use of others to be invited to provide services on subjects involving chemistry and allied areas.

Mission

- To improve the problem-solving capability of students through continuous learning to produce quality Chemists, Scientists, Academic intellectuals etc. in the field of Science and Technology.
- To bridge the gap between industry and academia by imparting technical/experimental knowledge along with its application in the practical world.
- To encourage innovation through multidisciplinary research and development activities.
- To inculcate human values and ethics into students to serve the society and nation with utmost devotion.
- To develop the overall personality of students along with the learning process simultaneously.

SCIENCE GRADUATE EMPLOYABILITY ATTRIBUTES

- Sound Knowledge and Understanding of the Domain Area
- Analytical and Critical Thinking and Problem-Solving Skills
- Scientific Temperament Towards Research and Innovation for the Betterment of Society
- Efficient Communication and Presentation Skills
- Dependability, Reliability, Responsibility, and Independent Leadership Abilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- To impart knowledge and understanding of the concepts of Organic Chemistry, Inorganic Chemistry, Physical Chemistry and related allied subjects.
- To equip students to handle apparatus and basic instrumentation used in chemistry laboratory to synthesize, isolate, and characterize molecules and materials.
- To interpret, analyze, and connect the multiple concepts of various topics through numerical, assignment, quiz, and experiment or project.
- To organize seminars, workshops, and group discussions on related topics and societal problems.
- To develop and enhance the writing, reviewing, and presentation skills of students.

PROGRAM LEARNING OUTCOMES (PLOs)

The students would be able to have:

- Knowledge and understanding of the fundamental concepts of Physical Chemistry, Organic Chemistry, Inorganic Chemistry, and allied subjects, along with their applications in research and industry.
- Better learning through a theoretical and evidence-based approach to explaining the chemical synthesis, analysis, and characterization of materials.
- Ability to demonstrate the basic principles of equipment and instruments.
- Ability to work both independently and in groups on complex problems to apply scientific knowledge to develop entrepreneurial abilities.
- Capacity to identify the research problem(s), plan, design, execute, and present the results and findings in a scientific manner.

MAPPING OF PROGRAM EDUCATIONAL OBJECTIVES AND PROGRAM LEARNING OUTCOMES

Programme Educational Objectives (PEO's)	Program Learning Outcomes (PLO's)				
	PLO1	PLO2	PLO3	PLO4	PLO5
PEO1					
PEO2					
PEO3					
PEO4					
PEO5					

PROGRAM CREDIT STRUCTURE

Semester	Broad Category of Courses								Total Credits	Remarks
	Major	Minor	Multidisciplinary	AEC	SEC	VAC	RP/Dissertation	Live Projects/Vocational Courses/Summer Internship		
I	8	4	3	2	2	2	*		21	Certificate: 46 Credits
II	8	4	3	2	2	2	*	4	25	
III	12	4	3	2	2	*	*		23	Diploma: 95 Credits
IV	12	4	*	2	2	2	*	4	26	
V	16	8	*	*	2	*	*		26	Degree : 145 Credits
VI	16	4	*	*	*	*	*	4	24	
VII	12	6*	*	*	*	*	6		18	Honours / Honours with Research: 181 Credits
VIII	12	6*	*	*	*	*	6		18	
3 Years	72	28	9	8	10	6	0	12	145	
%	49.66	19.31	6.21	5.52	6.90	4.14	0.00	8.28	100.00	
4 Years	96	28	9	8	10	6	12	12	181	
%	53.04	15.47	4.97	4.42	5.52	3.31	6.63	6.63	100.00	
*Students pursuing Honours will do 3 courses for 12 Credit in lieu of a Research Project/Dissertation. (2 Courses of 8 Credit in 7th Sem and 1 Course of 4 Credit in 8th Sem)										
**Students pursuing Honours with Research would complete 12 Credits of Research/Dissertation (2 Credit RM & 4 Credit Minor Project in 7th Sem and 6 Credit Major Project in 8th Sem)										

First Year First Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS101	Inorganic Chemistry-I (Atomic Structure and Chemical Bonding)	4	0	0	4	Major Course	
2	23CYBS102	Physical Chemistry-I (Gaseous State and Kinetics)	4	0	0	4	Major Course	
3	23CYBS151	Practical Inorganic Chemistry-I	0	0	4	2	Major Course Lab	
4	23CYBS152	Practical Physical Chemistry-I	0	0	4	2	Major Course Lab	
5		MDC#	3	0	0	3	Multidisciplinary Course	
6	23UAEC101	Functional English-I	2	0	0	2	Ability Enhancement Course	
7		Effective Communication Skills	0	0	2	1	Skill Enhancement Course (Soft)	
8		Digital Literacy & IT Skills	0	0	2	1	Skill Enhancement Course (Tech)	
9		Indian Constitution & Polity	2	0	0	2	Value Added Course	
TOTAL						21		
# Multidisciplinary Course List is attached separately, and a course shall be offered only when there is sufficient number of students opt for it								

First Year Second Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS201	Organic Chemistry-I (Basic Concepts in Organic Chemistry)	4	0	0	4	Major Course	
2	23CYBS202	Physical Chemistry-II (Solid & Liquid State and Equilibria)	4	0	0	4	Major Course	
3	23CYBS251	Practical Organic Chemistry-I	0	0	4	2	Major Course Lab	
4	23CYBS252	Practical Physical Chemistry-II	0	0	4	2	Major Course Lab	
5		MDC#	3	0	0	3	Multidisciplinary Course	
6	23UAEC201	Functional English-II	2	0	0	2	Ability Enhancement Course	
7		Advanced Excel Skills	0	0	2	1	Skill Enhancement Course (Soft)	
8		Teamwork & Interpersonal Skills	0	0	2	1	Skill Enhancement Course (Tech)	
9		Environment Protection & Sustainable Development	3	0	0	2	Value Added Course	
10	23CYBS271	Live Projects/Vocational Courses/Summer Internship				4	Live Projects/Vocational Courses/Summer Internship	
TOTAL						25		
# Multidisciplinary Course List is attached separately, and a course shall be offered only when there is sufficient number of students opt for it								
* Students would do Live Project/Vocational Course/Summer Internship of 4 Credits during Summer term of 6 to 8 weeks								
On Exit, students shall be awarded UG Certificate (in Chemistry) on securing the requisite 46 Credits on completion of II-Semester.								

Second Year Third Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS301	Inorganic Chemistry-II (Chemistry of s and p-block Elements)	4	0	0	4	Major Course	
2	23CYBS302	Organic Chemistry-II (Haloalkanes, Haloarenes and Oxygen Containing Functional Groups)	4	0	0	4	Major Course	
3	23CYBS351	Practical Inorganic Chemistry-II	0	0	4	2	Major Course	
4	23CYBS352	Practical Organic Chemistry-II	0	0	4	2	Major Course	
5	23CYBS303	Introduction of Nanochemistry and its applications	2	0	2	4	Minor Stream Course	
6		MDC-3	3	0	0	3	Multidisciplinary Course	
7	23UAEC301/401	Hindi/French/German	2	0	0	2	Ability Enhancement Course	Either Sem Course
8		Presentation Skills	0	0	2	1	Skill Enhancement Course (Soft)	
9		Statistical Analysis with SPSS	0	0	2	1	Skill Enhancement Course (Tech)	
TOTAL						23		
# Multidisciplinary Course List is attached separately, and a course shall be offered only when there is sufficient number of students opt for it								

Second Year Fourth Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS401	Inorganic Chemistry-III (d & f block elements and Coordination Chemistry)	4	0	0	4	Major Course	
2	23CYBS402	Physical Chemistry-III (Phase Transition and Chemical Thermodynamics)	4	0	0	4	Major Course	
3	23CYBS451	Practical Inorganic Chemistry-III	0	0	4	2	Major Course	
4	23CYBS452	Practical Physical Chemistry-III	0	0	4	2	Major Course	
5	23CYBS403	Analytical Methods in Chemistry	4	0	0	4	Minor Stream Course	
6		Professional Skills	0	0	2	1	Skill Enhancement Course (Soft)	
7		R Language Programming	0	0	2	1	Skill Enhancement Course (Tech)	
8		Sports, Yoga & Fitness				2	Value Added Courses	
9	23UAEC301/401	Hindi/French/German	2	0	0	2	Ability Enhancement Course	Either Sem Course
10	23CYBS471	Live Projects/Vocational Courses/Summer Internship				4	Live Projects/Vocational Courses/Summer Internship	
TOTAL						26		
* Students would do Live Project/Vocational Course/Summer Internship of 4 Credits during Summer term of 6 to 8 weeks								
On Exit, students shall be awarded UG Diploma (in Chemistry) on securing the requisite 95 Credits on completion of IV-Semester.								

Third Year Fifth Semester

S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS501	Organic Chemistry-III (Heterocyclic Chemistry, Nitrogen Containing Functional Groups and Polynuclear Hydrocarbons)	4	0	0	4	Major Course	
2	23CYBS502	Physical Chemistry-IV (Electrochemistry, Surface Chemistry & Photochemistry)	4	0	0	4	Major Course	
3	23CYBS503	Inorganic Chemistry-IV (Organometallics and Bioinorganic Chemistry)	4	0	0	4	Major Course	
4	23CYBS551	Practical Organic Chemistry-III	0	0	4	2	Major Course	
5	23CYBS552	Practical Physical Chemistry-IV	0	0	4	2	Major Course	
6	23CYBS504	Medicinal Chemistry	2	0	2	4	Minor Stream Course	
7	23CYBS505	Biomolecules of Life	4	0	0	4	Minor Stream Course	
8		Aptitude & Reasoning	0	0	2	1	Skill Enhancement Course (Soft)	
9		Programming with MATLAB	0	0	2	1	Skill Enhancement Course (Tech)	
TOTAL						26		

Third Year Sixth Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS601	Organic Chemistry-IV (Spectroscopy and its applications)	4	0	0	4	Major Course	
2	23CYBS602	Physical Chemistry-V (Fundamentals of Molecular Spectroscopy)	4	0	0	4	Major Course	
3	23CYBS603	Fundamentals of Quantum Chemistry	4	0	0	4	Major Course	
4	23CYBS651	Practical Organic Chemistry-IV	0	0	4	2	Major Course	
5	23CYBS652	Practical Physical Chemistry-V	0	0	4	2	Major Course	
6	23CYBS604	Computers for Chemist	2	0	2	4	Minor Stream Course	
8	23CYBS571	Live Projects/Vocational Courses/Summer Internship				4	Live Projects/Vocational Courses/Summer Internship	
TOTAL						24		
* Students would do Summer Internship of 4 Credits during Summer term of 6 to 8 weeks								
On Exit, students shall be awarded UG Degree (in Chemistry) on securing the requisite 145 Credits on completion of VI-Semester.								

Fourth Year Seventh Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS701	Reagents and Chemical Processes	3	0	1	4	Major Course	
2	23CYBS702	Polymer and Colloidal Chemistry	3	0	1	4	Major Course	
3	23CYBS703	Green Chemistry	4	0	0	4	Major Course	
4	23CYBS704	Energy & Environment*	2	0	0	2	Minor Course*	Students pursuing Honours
5	23CYBS705	Research Methodology#	2	0	0	2		Students pursuing PR
6	23CYBS706	Research Project	3	1	0	4	Research Project/Dissertation #	
TOTAL						18		
<p>* Students pursuing Honours will do 1 Course of 2 Credits in lieu of Research Project in 7th Semester & 4 Credit Dissertation</p> <p># Students pursuing Honours with Research will do 6 Credits RP/Dissertation (2 Credit RM & 4 Credit Research Project)</p>								

Fourth Year Eighth Semester								
S. No.	Course Code	Course Title	L	T	P	Credits	Course Category	Remarks
1	23CYBS801	Novel Inorganic Solids	3	0	1	4	Major Course	
2	23CYBS802	Metals in Medicine	2	0	2	4	Major Course	
3	23CYBS803	Inorganic Materials and its Industrial Importance	3	0	1	4	Major Course	
4	23CYBS804	Pharmaceutical Chemistry	4	0	0	4	Minor Course*	Students pursuing Honours
5	23CYBS805	Artificial Intelligence & Machine Learning in Chemistry	1	0	1	2	Minor Course*	Students pursuing Honours
6	23CYBS871	Research Project				6	Research Project/Dissertation	Students pursuing RP
TOTAL						18		
* Students pursuing Honours will do 2 Courses of 6 Credits in 8th Semester # Students pursuing Honours with Research would complete 6 Credits of Research/Dissertation in the 8th Semester								

On Exit, students shall be awarded **Bachelor Degree (in Chemistry)** (Honours with Research) or (Honours) after securing the requisite **181** Credits on completion of VIII-Semester.