



Syllabus from Department of Chemistry, BIT Mesra

CBCS based Syllabus for

I.M.Sc. (Chemistry) (1st-10th Semester)

and

M.Sc. (1st- 4th Semester)



**Department of Chemistry
B.I.T. Mesra, Ranchi
108, Academic Council, 20th Dec, 2021**



BIRLA INSTITUTE OF TECHNOLOGY- MESRA, RANCHI NEW COURSE STRUCTURE- To be effective from academic session 2021-22 Based on CBCS & OBE model for IMSc Chemistry								
Semester of Study (Recommended)	Level	Category of course	Course Code	Courses	Mode of Delivery & Credits L-Lecture; T-Tutorial; P-Practicals			Total Credits C-Credits
					L (Periods/week)	T (Periods/week)	P (Periods/week)	
FIRST	1	THEORY						
		CC-1	CH103R1	Inorganic Chemistry-I; Atomic Structure & Chemical Bonding-I	4	0	0	4
		CC-2	CH113	Physical Chemistry-I	4	0	0	4
		GE-1	PH109	Physics I (Annexure-I)	4	0	0	4
		AECC-1	MT132	Communication Skill I	2	0	0	1.5
		LABORATORIES						
		CCP-1	CH105	Inorganic Chemistry-I Lab	0	0	4	2
		CCP-2	CH106R1	Physical Chemistry-I Lab	0	0	4	2.0
		GEP-1	PH110R1	Physics-I Lab (Annexure-I)	0	0	4	2.0
			MC 101/102/103/104	Choice of: NCC/NSS/ PT & Games/Creative Arts (CA)	0	0	2	1
TOTAL							20.5	
THEORY								
SECOND	1	CC-3	CH114	Physical Chemistry-II	4	0	0	4
		CC-4	CH108R1	Organic Chemistry-I	4	0	0	4
		GE-2	MA108R1	Mathematics (Annexure-I)	5	1	0	6
		AECC-2	CE101	Env. Science	2	0	0	2
		SEC-1		Course Selection from Annexure-II	3	0	0	3
		LABORATORIES						
		CCP-3	CH109R1	Physical Chemistry-II Lab	0	0	4	2.0
		CCP-4	CH110R1	Organic Chemistry-I Lab	0	0	4	2.0
	MC105/106/107/108	Choice of: NCC/NSS/ PT & Games/Creative Arts (CA)	0	0	2	1		
TOTAL							24	
GRAND TOTAL FOR FIRST YEAR							44.5	
THEORY								
THIRD		CC-5	CH201R1	Inorganic Chemistry-II; s and p-Block Elements	4	0	0	4
		CC-6	CH215	Physical Chemistry-III	4	0	0	4
		CC-7	CH216	Organic Chemistry-II	4	0	0	4
		GE-3	PH111	Physics –II (Annexure-I)	4	0	0	4
		SEC-2		Course Selection from Annexure-II	3	0	0	3
		LABORATORIES						
		CCP-5	CH204	Inorganic Chemistry-II Lab	0	0	4	2.0
		CCP-6	CH205R1	Physical Chemistry-III Lab	0	0	4	2.0
		CCP-7	CH206R1	Organic Chemistry-II Lab	0	0	4	2.0
		GEP-3	PH112R1	Physics II Lab (Annexure-I)	0	0	4	2.0
	MC201/202/203/204	Choice of: NCC/NSS/ PT & Games/Creative Arts (CA)	0	0	2	1		
TOTAL							28	
THEORY								
FOURTH		CC-8	CH207R1	Inorganic Chemistry-III; Coordination Chemistry	4	0	0	4
		CC-9	CH217	Physical Chemistry-IV	4	0	0	4
		CC-10	CH218	Organic Chemistry-III	4	0	0	4
		GE-4	MA207R1	Mathematics (Annexure-I)	5	1	0	6
		LABORATORIES						



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		CCP-8	CH210	Inorganic Chemistry-III Lab	0	0	4	2	
		CCP-9	CH211R1	Physical Chemistry-IV Lab	0	0	4	2.0	
		CCP-10	CH212 R1	Organic Chemistry-III Lab	0	0	4	2.0	
			MC205/206/207/208	Choice of: NCC/NSS/ PT & Games/ Creative Arts (CA)	0	0	2	1	
		TOTAL						25	
		GRAND TOTAL FOR SECOND YEAR						53	
FIFTH	THEORY								
	3	CC-11	CH326	Physical Chemistry-V	4	0	0	4	
		CC-11	CH327	Organic Chemistry-IV	4	0	0	4	
		DSE-1	CH(303/304)	DSE I (Annexure-III)	4	0	0	4	
		DSE-2	CH(305/306R1)	DSE II (Annexure-III)	4	0	0	4	
		AECC-3	MT133	Communication Skill II	2	0		1.5	
	LABORATORIES								
	3	CCP-11	CH307R1	Physical Chemistry-V Lab	0	0	4	2.0	
		CCP-12	CH308R1	Organic Chemistry-IV Lab	0	0	4	2.0	
		DSEP-1	CH309/CH310	DSE I-LAB (Annexure-III)	0	0	4	2	
		DSEP-2	CH311/CH312	DSE II-LAB (Annexure-III)	0	0	4	2	
			TOTAL						25.5
	SIXTH	THEORY							
3		CC-13	CH313R1	Inorganic Chemistry-IV; Organometallic Chemistry	4	0	0	4	
		CC-14	CH328	Organic Chemistry-V	4	0	0	4	
		DSE-3	CH(317/318)	DSE III (Annexure-III)	4	0	0	4	
LABORATORIES									
3		CCP-13	CH319	Inorganic Chemistry-IV Lab	0	0	4	2.0	
		CCP-14	CH320R1	Organic Chemistry-V Lab	0	0	4	2.0	
		DSEP-3	CH (321/322)	DSE III-LAB(Annexure-III)	0	0	4	2	
		DSE-4	CH300	B.Sc. Project Work/Dissertation				6	
			TOTAL						24
		GRAND TOTAL FOR THIRD YEAR						49.5	
		GRAND TOTAL FOR B.Sc. (Honours) CHEMISTRY						147	
NOTE: The Exit option with B.Sc. <u>Chemistry (Honours)</u> can be offered to the student who wants to get it after successful completion of 6th semester.									



SEVENTH								
THEORY								
4	CC15 to CC19	CH401	Basic Inorganic Chemistry	4	0	0	4	
		CH402	Chemical Kinetics & Surface Chemistry	3	0	0	3	
		CH403R1	Reactions Mechanism in Organic Chemistry	3	0	0	3	
		CH404R1	Organometallic Chemistry	3	0	0	3	
		CH405R1	Principles of Organic Synthesis	4	0	0	4	
	GE-5		Open Elective (Annexure-I)	3	0	0	3	
2	MC	MT204	Constitution of India	2	0	0	0	
LABORATORIES								
4	CCP-15 CCP-16	CH406	Physical Chemistry-VI Lab	0	0	4	2	
		CH407	Organic Chemistry-VI Lab	0	0	4	2	
TOTAL								24
EIGHTH								
THEORY								
4	CC20 - CC24	CH408	Advanced Inorganic Chemistry	3	0	0	3	
		CH409	Quantum Chemistry & Group Theory	4	0	0	4	
		CH410R1	Modern Organic Chemistry	3	0	0	3	
		CH411	Equilibrium, Non-Equilibrium & Statistical Thermodynamics	3	0	0	3	
		CH412	Analytical Chemistry	4	0	0	4	
	GE-6		Open Elective (Annexure-I)	3	0	0	3	
LABORATORIES								
4	CCP-17	CH413	Inorganic Chemistry-V Lab	0	0	4	2	
	CCP-18	CH414	Theoretical & Computational Chemistry Lab	0	0	4	2	
TOTAL								24
GRAND TOTAL FOR FOURTH YEAR								48
NINTH								
THEORY								
5	CC25	CH501	Spectroscopic Elucidation of Molecular Structure	4	0	0	4	
	DSE-5		DSE-5 (IN: CH502R1/505; OR: CH504R1/515; PH: CH503/506) (Annexure-III)	4	0	0	4	
LABORATORIES								
5	CCP19	CH508	Advanced Characterization Lab	0	0	4	2	
	DSEP-5	CH509/510/511	DSEP-5 (Inorganic/Physical/Organic) (Annexure-III)	0	0	4	2	
	DSE-6	CH512	Research Dissertation Part I	0	0	8	8	
TOTAL								20
TENTH								
THEORY								
5	DSE-7	CH513/514/507R1	DSE-8 (Inorganic/Physical/Organic) (Annexure-III)	4	0	0	4	
	DSE-8	CH550	Research Dissertation Part II	0	0	8	8	
TOTAL								12
GRAND TOTAL FOR FIFTH YEAR								32
GRAND TOTAL (B.Sc.) [IMSc Semester I to Semester VI]								147
GRAND TOTAL (M.Sc.) [IMSc Sem VII to Sem-X /or M.Sc Sem I to Sem IV]								80
GRAND TOTAL (Integrated M.Sc.)								227



CREDIT DISTRIBUTION in 5 Yrs. Integrated MSc. Chemistry Program with B.Sc. Honors Exit Provision:

	CC	GE (Open) (Annexure-I)	AECC	SEC (Annexure-II)	DSE (Annexure-III)	MC	Total
Sem-I to Sem-VI	84	24	5	6	24	4	147
Sem-VII to Sem-X	48	6	NA	nil	26	0	80
							227

CC: Core Course; GE: Generic/Open Elective; AECC: Ability Enhancement Compulsory Courses.
 SEC: Skill Enhancement Courses; DSE: Department Specific Elective.
 MC: Mandatory Course (Institute Extracurricular /Humanities/Social Studies etc.)

ANNEXURE-I: GENERIC/Open ELECTIVE (GE) FROM OTHER DEPARTMENTS

Semesters	Code No.	Name of the Courses	Prerequisites	L	T	P	C
SEM-1	PH109	Physics I	Intermediate level	4	0	0	4
	PH110R1	Physics-I Lab	Intermediate level	0	0	2	2
SEM-2	MA108R1	Mathematics III	Intermediate Level	5	1	0	6
SEM-3	PH111	Physics II	Intermediate Level	4	0	0	4
	PH112R1	Physics-II Lab	Intermediate Level	0	0	2	2
SEM-4	MA207R1	Mathematics IV	Intermediate Level	5	1	0	6
SEM-7		Generic/Open Elective from Other Departments		3	0	0	3
SEM-8		Generic/Open Elective from Other Departments		3	0	0	3

ANNEXURE-2: SKILL ENHANCEMENT COURSE (SEC) [ELECTIVE]

Semesters	Code No.	Name of the Courses	Prerequisites	L	T	P	C	
SEM-2	1	CH115	Green Methods in Chemistry	Intermediate level chemistry	3	0	0	3
		BE206	Chemical Process Calculations	Intermediate level chemistry	3	0	0	3
		CH116	Fuel Chemistry	Intermediate level chemistry	3	0	0	3
SEM-3	2	CH219	Intellectual Property Rights	Intermediate level chemistry	3	0	0	3
		IT201	Basics of Intelligent Computing	Intermediate level chemistry	3	0	0	3


ANNEXURE-III: DEPARTMENT SPECIFIC ELECTIVE (DSE):
Each theory elective requires to combine with their specific lab during selection.

Semesters	Code No.	Name of the Courses	Prerequisites	L	T	P	C	
SEM-V DSE-1	3	CH303	Analytical Methods in Chemistry	Intermediate Chemistry	4	0	0	4
		CH309	Analytical Methods in Chemistry Lab	Intermediate Chemistry	0	0	4	2
		CH304	Industrial Chemical & Environment	Intermediate Chemistry	4	0	0	4
		CH310	Industrial Chemical & Environment Lab	Intermediate Chemistry	0	0	4	2
SEM-V DSE-2	3	CH305	Inorganic Materials of Industrial Importance	Intermediate Chemistry	4	0	0	4
		CH311	Inorganic Materials of Industrial Importance Lab	Intermediate Chemistry	0	0	4	2
		CH306R1	Molecular Modeling & Drug Design	Intermediate Chemistry	4	0	0	4
		CH312	Molecular Modeling & Drug Design Lab	Intermediate Chemistry	0	0	4	2
SEM-VI DSE-3 and DSE-3 Lab	3	CH315	Research Methodology for Chemistry	Intermediate Chemistry	4	0	0	4
		CH321	Research Methodology for Chemistry Lab	Intermediate Chemistry	0	0	4	2
		CH316	Novel Inorganic Solids	Intermediate Chemistry	4	0	0	4
		CH322	Novel Inorganic Solids Lab	Intermediate Chemistry	0	0	4	2
		CH317	Polymer Chemistry	Intermediate Chemistry	4	0	0	4
		CH323	Polymer Chemistry Lab	Intermediate Chemistry	0	0	4	2
		CH318	Instrumental Methods of Chemical Analysis	Intermediate Chemistry	4	0	0	4
		CH324	Instrumental Methods of Chemical Analysis Lab	Intermediate Chemistry	0	0	4	2
Inorganic Group								
SEM-IX DSE-5	5	CH502R1	Solid State & Nuclear Chemistry	B.Sc. Chemistry	4	0	0	4
		CH505	Bioinorganic Chemistry	B.Sc. Chemistry	4	0	0	4
		CH509	Special Lab (Inorganic)	B.Sc. Chemistry	0	0	4	2
SEM-X DSE-7		CH513	Inorganic Photochemistry	B.Sc. Chemistry	3	1	0	4
Physical Group								
SEM-IX DSE-5		CH503	Molecular Spectroscopy	B.Sc. Chemistry	4	0	0	4
		CH506	Advanced Electrochemistry	B.Sc. Chemistry	4	0	0	4
		CH510	Special Lab (Physical)	B.Sc. Chemistry	0	0	4	2
SEM-X DSE-7		CH514	Chemical Application of Group Theory	B.Sc. Chemistry	4	0	0	4
Organic Group								
SEM-IX DSE-5		CH504	Advanced Organic Synthesis	B.Sc. Chemistry	4	0	0	4
		CH515	Interdisciplinary Organic Chemistry	B.Sc. Chemistry	4	0	0	4
		CH511	Special Lab (Organic)	B.Sc. Chemistry	0		4	2
SEM-X DSE-7		CH507	Selected Topics in Organic Synthesis	B.Sc. Chemistry	4	0	0	4

GENERIC/OPEN ELECTIVE (GE) CHEMISTRY FOR OTHER DEPARTMENTS

LEVEL	Code No.	Name of the Courses	Prerequisites	L	T	P	C	
SEM-1/2 B. TECH	1	CH101	CHEMISTRY-I	Intermediate Chemistry	3	1	0	4
		CH102	CHEMISTRY-I LAB	Intermediate Chemistry	0	0	4	2
SEM-1/2 I.MSc.	1	CH111	GENERAL CHEMISTRY-I	Intermediate Chemistry	4	0	0	4
		CH112R1	GENERAL CHEMISTRY-I LAB	Intermediate Chemistry	0	0	4	2
SEM-3/4 I.MSc.	2	CH213	GENERAL CHEMISTRY-II	Intermediate Chemistry	4	0	0	4
		CH214R1	GENERAL CHEMISTRY-I LAB	Intermediate Chemistry	0	0	4	2