



Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil College Vashi, Navi Mumbai
(Autonomous)


Name of the Faculty: Science and Technology

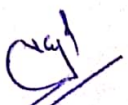
Name of the Program: Masters in Science

Program Outcomes (POs)

PO-1	Disciplinary Knowledge and Skills: Acquire the comprehensive and in-depth knowledge of various subjects in sciences such as Physics, Chemistry, Mathematics, Microbiology, Bio-analytical Science, Computer Science, Data Science, Information Technology and disciplinary skills and ability to apply these skills in the field of science, technology and its allied branches.
PO-2	Communication and Presentation Skills: Develop various communication skills including presentation to express ideas evidently to achieve common goals of the organization.
PO-3	Creativity and Critical Judgement: Facilitate solutions to current issues based on investigations, evaluation and justification using evidence based approach.
PO-4	Analytical Reasoning and Problem Solving: Build critical and analytical attitude in handling the problems and situations.
PO-5	Sense of Inquiry: Curiously raise relevant questions based on highly developed ideas, scientific theories and its applications including research.
PO-6	Use of Digital Technologies: Use various digital technologies to explore information/data for business, scientific research and related purposes.
PO-7	Research Skills: Construct, collect, investigates, evaluate and interpret information/data relevant to science and technology to adapt, evolve and shape the future.
PO-8	Application of Knowledge: Develop scientific outlook to create consciousness against the social myths and blind faith.
PO-9	Moral and Ethical Reasoning: Imbibe ethical, moral and social values to develop virtues such as justice, generosity and charity as beneficial to individuals and society at large.
PO-10	Leadership and Teamwork: Work cooperatively and lead proactively to achieve the goals of the organization by implementing the plans and projects in various field-based situations related to science, technology and society at large.
PO-11	Environment and Sustainability: Create social awareness about environment and develop sustainability for betterment of future.
PO-12	Lifelong Learning: Realize that pursuit of knowledge is a lifelong activity and in combination with determined efforts, positive attitude and other qualities to lead a successful life.


Program
Coordinator


BOS Chairman


Principal

Name of the Faculty: Science and Technology
Name of the Specific Program: MSc Chemistry
Program Specific Outcomes (PSO)



PSO-1	Advanced knowledge of the topics which can develop the problem solving skills using chemical principles.
PSO-2	Understand advanced instrumental techniques and its applications in characterization and chemical reactions.
PSO-3	To inculcate the professional, ethical values, environmental aspects in various fields of chemistry.
PSO-4	Develop research skills through dissertation/Project work in different fields of chemistry


Program
Coordinator


BOS Chairman


Principal



Title of Specific Program: M.Sc. Inorganic Chemistry

Course Code	Title of Course	Course Outcomes
		After successful completion of each course in Chemistry a learner should be able to;
Semester-I		
PGCH101	Physical Chemistry	<ol style="list-style-type: none">1. To discuss concept of quantization, quantum numbers and degeneracy of energy level, kinetics and mechanism of chain reaction (2).2. To explain concept of classical thermodynamics and quantum chemistry (2).3. To deduce Maxwell equations and Schrodinger wave equation (4).4. To summarize basics of electrochemistry (2).
PGCH102	Inorganic Chemistry	<ol style="list-style-type: none">1. To derive wave functions, construct molecular orbital diagram, and Symmetry adapted linear combinations (SALC) for polyatomic species (5,6)2. To analyse VBT, molecular symmetry and applications of group theory (4,5)3. To discuss the various aspects of materials chemistry, nanomaterials and co-ordination chemistry (2)4. To interpret the electronic spectra of co-ordination compounds (3)
PGCH103	Organic Chemistry	<ol style="list-style-type: none">1. To apply the thermodynamic and kinetic requirements of a reaction (3).2. To explain nucleophilic substitution reactions and aromaticity (2)3. To determine stereochemistry of molecules with two or more chiral centres (2)4. To predict the reaction mechanism by using various oxidizing and reducing reagents (4)
PGCH104	Analytical Chemistry	<ol style="list-style-type: none">1. To apply the various spectroscopic techniques for qualitative and quantitative analysis (3)2. To understand various terms used in analytical chemistry and hyphenated techniques (2)3. To determine the concentration of unknown sample by spectroscopic methods. (2)4. To interpret the thermo-gravimetric curves of various samples (4)
PGCHP101	Physical Chemistry Practical	<ol style="list-style-type: none">1. To understand how to determine the heat of solution at different temperature, ionic strength of various inorganic salts (2)2. To evaluate kinetics of the reactions. (5)3. To understand various methods of graph plotting.

		4. To understand various instrumental techniques.
PGCHP102	Inorganic Chemistry Practical	1. To synthesize and characterize various inorganic complexes (5). 2. To determine the electrolytic nature and equilibrium constants of inorganic compounds. (2)
PGCHP103	Organic Chemistry Practical	1. To plan the synthesis of organic compounds. (4,6) 2. To know safety aspects including MSDS. (1) 3. To calculate stoichiometric requirement (5)
PGCHP104	Analytical Chemistry Practical	1. To estimate the amount of Cr (III), Fe(II), alloy sample by complexometric titration. (5) 2. To determine the breakthrough capacity of a cation exchange resin (2)

Semester-II

PGCH201	Physical Chemistry	1. To describe the fugacity of real gases using graphical method, equation of state, and various mixing properties (2) 2. To deduce various equations in modern thermodynamics, surface chemistry and quantum chemistry. (4) 3. To construct probability density curves, radial and angular plots for different orbitals. (4,6) 4. To understand chemical kinetics, molecular reaction dynamics, solid state chemistry and phase equilibria (2)
PGCH202	Inorganic Chemistry	1. To explain the methods of determining rate of reaction and inorganic reaction mechanism (2) 2. To apply Eighteen and sixteen electron rules for various organometallic compounds (3,5) 3. To discuss the environmental concepts of heavy metals (2) 4. To understand various concepts in bioinorganic chemistry (2)
PGCH203	Organic Chemistry	1. To understand the basic concept of molecular orbital theory, UV-Visible and IR spectroscopic techniques. (2) 2. To predict the reaction mechanism of various rearrangement reactions (4) 3. To illustrate various alkylating agents using carbanion intermediate (2) 4. To understand and apply various spectroscopic techniques for predicting organic compounds (2,4,5)
PGCH204	Analytical Chemistry	1. To understand concepts in chromatography, spectroscopic and radio - analytical techniques. (2) 2. To study the different types of surface analytical techniques. (2) 3. To evaluate electro analytical techniques (5) 4. To summarize the instrumentation of selected analytical techniques (2)
PGCHP201	Physical Chemistry	1. To construct polar plots of atomic orbitals, phase diagram. (4,6)

	Practical	<ol style="list-style-type: none"> To evaluate the transition temperature and rate constant of chemical reactions. (5) To measure physical parameters of chemical reaction using various instrumental techniques. (5)
PGCHP202	Inorganic Chemistry Practical	<ol style="list-style-type: none"> To analyse various ore and alloy for metal contents (4) To estimate amount of metal potentiometrically in given sample. (5)
PGCHP203	Organic Chemistry Practical	<ol style="list-style-type: none"> To separate given binary mixture. (4) To identify separated organic components by microscale technique. (2,5)
PGCHP204	Analytical Chemistry Practical	<ol style="list-style-type: none"> To analyse the fertilizer sample using flame -photometry To determine amount of various metal ions by using different analytical techniques (2)
Semester-III		
PGCHH301	Chemistry of Inorganic Solids	<ol style="list-style-type: none"> To predict the structures different types of structures and account for their properties. (4) To explain the different types of defects, faults in crystals. (2) To discuss various methods of crystal growth for inorganic solids. (2) To summarize Diffusion in Solids, Solid state reactions, Liquid Crystals (2)
PGCHH302	Bioinorganic and Coordination Chemistry	<ol style="list-style-type: none"> To describe coordination geometry of the metal ion in biological systems, role of metal ions in biological electron transfer processes (2) To classify Lewis acids and bases based on frontier molecular orbital topology, Group Characteristic in periodic table. (2) To illustrate Pourbaix diagrams of different chemical species. (4) To apply Molecular Orbital Theory, Angular Overlap Model for Complexes. (4)
PGCHH303	Spectral Methods in Inorganic Chemistry	<ol style="list-style-type: none"> To describe different diffraction methods. (2) To Elucidate the ESR & Mossbauer spectra of the given sample. (4) To describe basic principle, instrumentation involved in ESR & Mossbauer spectroscopy. (2)
PGCHIEC-I 304	Applied Chemistry (Elective)	<ol style="list-style-type: none"> To summarize handling of Hazardous Materials, Toxic Materials, Explosives and Inflammable Materials. (2) To propose ideas for recycling & recovery of metals used in the laboratory, synthesis of industrially important chemicals at small scale. (5) To summarize industrial preparation of Lime, Chlorine and Caustic soda, Ceramics and refractory materials. (2)



PGCHIEC-II304	Applied Chemistry (Elective)	<ol style="list-style-type: none">1. To summarize classification, manufacture and applications of Inorganic fibres, Inorganic fillers, industrially important chemicals. (2)2. To classify properties and uses of protectives, adsorbents, antimicrobial agents, astringents etc. (2)3. To discuss optical properties of metal and semiconductor nanoparticles. (2)4. To rewrite mechanism and salient features of photosynthesis reaction. (2)
PGCHIP301	Analysis of ores/alloys	<ol style="list-style-type: none">1. To perform analysis of different ores and alloys to find out contents. (4)
PGCHIP302	Solvent Extraction	<ol style="list-style-type: none">1. To Separate different mixtures of inorganic cations using solvent extraction technique (4)
PGCHIP303	Inorganic Preparations	<ol style="list-style-type: none">1. To prepare different Inorganic complexes. (4)
PGCHIP304	Analysis of the samples	<ol style="list-style-type: none">1. To analyse different commercial samples by various methods. (5)

Semester - IV

PGCH401	Properties of Inorganic Solids and Group Theory	<ol style="list-style-type: none">1. To discuss conductivity of Solid Electrolytes, Fast Ion Conductors, applications of inorganic solids in magnetic and electronic devices. (2)2. To describe Dielectric, Ferroelectric, Piezoelectric and Pyroelectric Materials and deduce their Inter-relationships.3. To predict structures and to interpret magnetic Properties of Transition metal Oxides. (2)4. To construct energy level diagrams, Direct product and Correlation diagrams for d^2 ions in octahedral and tetrahedral ligand field. (6)
PGCH402	Organometallics and main group Chemistry	<ol style="list-style-type: none">1. To apply theory of Electron Count and deduce stability Structures of Clusters. (4)2. To illustrate Bonding in boranes, Heteroboranes, Carboranes. (4)3. To summarize catalytic activity in organic Reactions. (2)4. To recite properties, structures and stability of Silicates. (2)


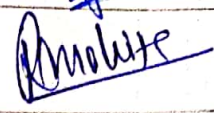
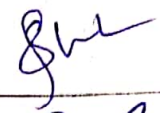

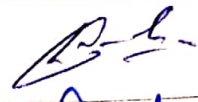
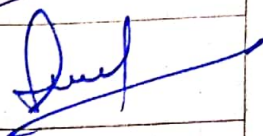


PGCHI403	Instrumental Methods in Inorganic Chemistry	<ol style="list-style-type: none"> To summarize selection rules of IR & Raman spectra, IR absorption bands of metal - donor atoms, theory, instrumentation involved in Ion Scattering Spectra, Secondary Ion Mass Spectroscopy, Auger Emission Spectroscopy, ESCA, SEM, AFM & TEM (2) To apply principles of DSC and DTA in the determination of thermodynamic parameters, thermal characterization to polymers, quantitative analysis of the mixture of oxalates. (4) To investigate structures of molecules on the basis of IR & Raman using group theory criterion. (5)
PGCHIE-I 404	Research methodology	<ol style="list-style-type: none"> To understand various terminologies like Journal abbreviations, abstracts, current titles, reviews etc. (2) To recite various terms like Subject Index, Substance Index, Author Index, Formula Index, and other Indices with examples. (2) To analyse and present data of studied material using various calculative methods, tools and software. (5) To conclude literature surveys and reviews, organize a poster display and give an oral presentation. (5) To describe Safe working procedure in laboratories, safe storage and use of hazardous chemicals. (2)
PGCHIP401	Analysis of ores/alloys	<ol style="list-style-type: none"> To perform analysis of different ores and alloys to find out contents. (5)
PGCHIP402	Solvent Extraction	<ol style="list-style-type: none"> To Separate different mixtures of inorganic cations using solvent extraction technique (4)
PGCHIP403	Inorganic Preparations	<ol style="list-style-type: none"> To prepare different Inorganic complexes. (4)
PGCHIP404	Project Evaluation & Spectral Interpretation	<ol style="list-style-type: none"> To perform research project having different methods studied at theory classes and interpret spectra and present it in a proper format. (6)

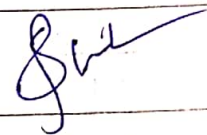
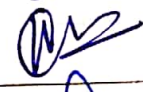
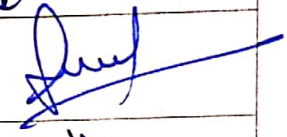
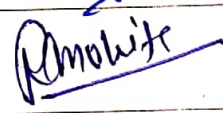
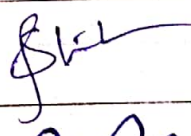
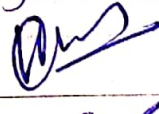
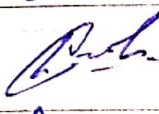
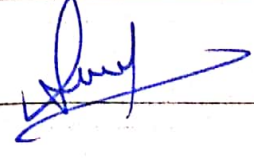
Note: Numbers in bracket () indicates cognitive levels of revised Blooms Taxonomy as follows:

(1): Remembering, (2): Understanding, (3): Applying, (4): Analysing, (5): Evaluating, (6): Creating

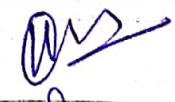
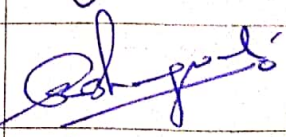
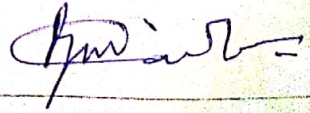
Sr. No	Course Code	Name of Course Coordinator	Signature
SEM-I			
1	PGCH101	Dr. B. S. Shinde	
2	PGCH102	Dr. V. A. Thakur	

3	PGCH103	Dr. G.C. Wadhwa	
4	PGCH104	Dr. R.D. Mohite	
5	PGCHP101	Dr. B. S. Shinde	
6	PGCHP102	Dr. V. A. Thakur	
7	PGCHP103	Dr. L. V. Gavali	
8	PGCHP104	Dr. G.C. Wadhwa	

SEM-II

9	PGCH201	Dr. B. S. Shinde	
10	PGCH202	Dr. V. A. Thakur	
11	PGCH203	Dr. G.C. Wadhwa	
12	PGCH204	Dr. R.D. Mohite	
13	PGCHP201	Dr. B. S. Shinde	
14	PGCHP202	Dr. V. A. Thakur	
15	PGCHP203	Dr. L. V. Gavali	
16	PGCHP204	Dr. G.C. Wadhwa	

SEM-III

17	PGCHI301	Dr. V. A. Thakur	
18	PGCHI302	Mr. S. R. Bhagwat	
19	PGCHI303	Ms. G. M. Gaidhane	



20	PGCHIEC-I 304	Mr. G.C.Wadhva	
21	PGCHIEC-II304	Dr. V. A. Thakur	
22	PGCHIP301	Ms. G. M. Gaidhane	
23	PGCHIP302	Dr. V. A. Thakur	
24	PGCHIP303	Dr. V. A. Thakur	
25	PGCHIP304	Ms. G. M. Gaidhane	

SEM-IV

26	PGCHI401	Dr. V. A. Thakur	
27	PGCHI402	Mr. S. R. Bhagwat	
28	PGCHI403	Ms. G. M. Gaidhane	
29	PGCHIE-I 404	Mr. G. C. Wadhva	
30	PGCHIP401	Ms. G. M. Gaidhane	
31	PGCHIP402	Dr. V. A. Thakur	
32	PGCHIP403	Dr. V. A. Thakur	
33	PGCHIP404	Ms. G. M. Gaidhane	

Program
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BOS Chairman

Principal