



!! न हि ज्ञानेन सदृशं ! पवित्रमिह विद्यते !!
Shriram Shikshan Sanstha's
Shriram Mahila Vidnyan Mahavidyalaya, Paniv
Tal.: Malshiras, Dist.: Solapur, 413113
(Affiliated to S. N. D. T. Women's University, Mumbai)

Criteria II

Key Indicator- 2.6 Student Performance and Learning Outcome

Metric No. 2.6.1. *Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website.*

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**List of courses offered during last
five years (B. Sc.)**





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Shriram Shikshan Sanstha's

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(Affiliated to S. N. D. T. Women's University, Mumbai)

Under Graduate

List of courses offered across all programs during last five years

Program code	Program Name	Course code	Course Name	Year of introduction
	F. Y. B. Sc. (Sem. I)	100101	Environmental science (Foundation course)	2014
		102101	Inorganic chemistry	
		102102	Organic chemistry	
		102201	Lab Course	
		104101	Algae, Fungi, Lichens, Bacteria, Viruses.	
		104102	Morphology, Taxonomy and Anatomy	
		104201	Lab Course	
		105101	Animal Diversity and Physiology	
		105102	Animal Diversity, Ecology and Biodiversity	
		105201	Lab Course	
	F. Y. B. Sc. (Sem. II)	200101	Women's issue (Foundation course)	2014
		202101	Physical Chemistry	
		202102	Inorganic Chemistry	
		202201	Lab Course	
		204101	Bryophyta, Pteridophyta, Gymnosperms and Ecology.	
		204102	Physiology, Biochemistry, Biotechnology and cytogenetics.	
		204201	Lab Course	
		205101	Genetics, Biochemistry & Evolution	
		205102	Basic embryology & Biotechnologies	
		205201	Lab Course	



S. Y. B. Sc. (Sem. I)	300101	Women's issue (Foundation course)	2014
	302101	Organic Chemistry	
	302102	Physical Chemistry	
	302201	Lab Course	
	305101	Parasitology	
	305102	Cell biology & Instrumentation	
	305201	Lab Course	
S. Y. B. Sc. (Sem. II)	400101	English I (Foundation course)	2014
	402101	Inorganic Chemistry	
	402102	Physical Chemistry	
	402201	Lab Course	
	405101	Applied Zoology	
	405102	Current trends in Zoology	
	405201	Lab Course	
T. Y. B. Sc. (Sem. I)	500101	English II (Foundation course)	2014
	502101	Physical Chemistry	
	502102	Organic Chemistry	
	502103	Inorganic Chemistry	
	502104	Analytical Chemistry	
	502201	Lab Course	
	502202	Lab Course	
T. Y. B. Sc. (Sem. II)	600101	English I (Foundation course)	2014
	602101	Physical Chemistry	
	602102	Organic Chemistry	
	602103	Inorganic Chemistry	
	602104	Analytical Chemistry	
	602201	Lab Course	
	602202	Lab Course	



Principal
Shriram Mahila Vidyayan Mahavidyalaya
Paniv. Tal. Malshiras, Dist. Solapur

Program outcomes, Program specific outcomes and Course outcomes

(B. Sc.)





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(Affiliated to S. N. D. T. Women's University, Mumbai)

Department of Chemistry

Undergraduate Program Outcomes (POs)

1. **Disciplinary Knowledge:** Good knowledge and understanding of major concepts, theoretical principles and experimental findings of the subject and its different subfields.
2. **Skills:** Ability to use modern instrumentation and laboratory techniques to design and perform experiments.
3. **Critical thinking:** Ability to engage in reflective and independent thinking by understanding the concepts in every area of the subject.
4. **Problem solving:** Capability to deduce a problem associated with subject and applies the class room learning into practice to offer a solution for the same.
5. **Sense of inquiry:** Capability for asking relevant/appropriate questions relating to the issues and problems and planning, executing and reporting the results of a theoretical or experimental investigation.
6. **Communication Skills:** Ability to share thoughts, ideas and applied skills of communication in its various perspectives like written communication, oral communication etc.
7. **Lifelong learners:** Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling in all areas of respective subjects.
8. **Digitally literate:** Adequate training in the application of digital knowledge in higher education and workplace.
9. **Ethics:** Recognize different value systems including one's own, understand the moral dimensions of one's decisions, and accept responsibility for them.
10. **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.




Principal

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Department of Chemistry (UG)

Program Specific Outcomes (PSOs)

The college has clearly stated learning outcomes in its vision and mission statement. Aims and objectives are clearly defined and stated by the college. The faculty and the students are made aware of the learning outcomes for all the programmes taught. Details are as follows:

- Learning outcomes for all the programmes taught are clearly stated in syllabi itself.
- Syllabi of every programme with aims and objectives, content of the course, reference books, pattern of examination and expected learning outcomes is given to the students by the faculty. It is also made available on the college and University websites.
- The students are made aware of the learning outcomes through the Principal's address in the beginning of the academic year in the form of induction programme.
 1. The specific outcome of this course is to enable students to acquire sufficient knowledge and skills related to Inorganic chemistry.
 2. The program specific outcome of this course is to enable students to acquire knowledge and skills and develop analytical approach for problem solving.
 3. Further a research oriented learning that develops analytical and integrative problem-solving approaches.
 4. Also to get hands on various preparations in organic chemistry with laboratory skills on preparation of various solutions, design of some reactions with its work up and isolation.
 5. To create, select and apply appropriate techniques, resources and modern technology in multidisciplinary environment.




Principal

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Department of Botany

Course Outcomes (COs)

Name of the class	Course title	Course outcome
B. Sc. I. Botany (Sem.-I)	Botany Paper I	After completion of course learner can know about Algae, Fungi, Lichen, Bacteria and Viruses
	Botany Paper II	After completion of course learner can know about Morphology, Anatomy and taxonomy of plant.
	Lab Course: (Practical: I)	After completion of course learner can know practical knowledge about Stages in the life cycle of Algae, Fungi, Lichen and Bacteria
	Lab Course: (Practical: II)	After completion of course learner can know about Morphology of plants, Flower, Morphology Inflorescence, Angiospermic families and plant Anatomy.
B. Sc. I. Botany (Sem.-II)	Botany Paper I	After completion of course learner can know about Bryophyta, Pteridophyta, Gymnosperms and Ecology.
	Botany Paper II	After completion of course learner can know about Plant Physiology, Biochemistry, Biotechnology and cytogenetics.
	Lab Course: (Practical: I)	After completion of course learner can know practical knowledge about about stages in the life cycle of Bryophytes, Pteridophytes, Gymnosperms and Ecology
	Lab Course: (Practical: II)	After completion of course learner can know practical knowledge about Physiology, Biochemistry, Biotechnology, Cytology and Genetics




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Department of Zoology
Course Outcomes (COs)

Name of program	Course title	Course outcome
B. Sc. I. (Sem. I)	Zoology paper I	After completion of course learner can know about Diversity of Animal Kingdom I and Basic Animal Physiology
	Zoology paper II	After completion of course learner can know about Diversity of Animal Kingdom II, Ecology and Biodiversity.
	Lab Course	After completion of course learner can know about Animal Classification like Protozoa, Porifera, Coelenterata, Nematelminthes, Annelida, Arthropoda, Chondrichthyes, Amphibia, Reptilia and Aves. <ul style="list-style-type: none"> • Determination of pH of soil. • Estimation of Dissolved Oxygen in the water sample • Estimation of Hardness of water in the water sample.
B. Sc. I. (Sem. II)	Zoology paper I	After completion of course learner can know about Genetics, Evolution, Biochemistry and Biodiversity.
	Zoology paper II	After completion of course learner can know about Basic Embryology and Basic Biotechnology
	Lab Course	After completion of course learner can know about Chromatographic techniques, Extraction and qualitative detection of nucleic acids, Qualitative tests for proteins, lipids and carbohydrates. Introduction to basic laboratory safety practices, precautions and safety rules.
B. Sc. II. (Sem. III)	Zoology paper II	After completion of course learner can know about Parasitology, Protozoan Parasitology, Helminth Parasitology and Epidemiology
	Zoology paper II	After completion of course learner can know about Cell Biology.
	Lab Course	After completion of course learner can know about Identification of Protozoans parasites and Working and principal of various instruments.
B. Sc. II. (Sem. IV)	Zoology paper I	After completion of course learner can know about Economics Importance Insects, Cattle farming, Dairy Science and Piggery and Poultry
	Zoology paper II	After completion of course learner can know about Basic Molecular Biology and Advanced Biotechnology
	Lab Course	After completion of course learner can know about Economically important insects, Animal Husbandry (Animal Types) and Poultry.





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Department of Chemistry

Course outcome (COs)

Name of program	Course title	Course outcome
B. Sc. I. General Chemistry (Sem.-I)	Chemistry P-I (Inorganic Chemistry)	After successful completion of course a Student should be able to <ul style="list-style-type: none"> ➤ Understand atomic structure, modern periodic table and periodic properties of elements. ➤ Understand the concept of chemical bonding ➤ Learn chemistry of s and p block elements
	Chemistry P-II (Organic Chemistry)	<ul style="list-style-type: none"> ➤ Lerner can know about IUPAC names of any organic compounds. ➤ Know structure and bonding of compounds of carbon. ➤ Gain basic knowledge of stereochemistry of organic molecules. ➤ Learn chemistry of alkenes, alkynes, alkadienes, cycloalkanes, alkyl halides, Grignard's Reagent, Alcohols, ethers, carbonyl compounds, carboxylic acids and amines.
	Lab Course:	After successful completion of course a Student should be able to <ul style="list-style-type: none"> ➤ Understand Inorganic volumetric analysis and Qualitative Analysis:
B. Sc. I. General Chemistry (Sem.-II)	Chemistry-I (Physical Chemistry)	After successful completion of course a Student should be able to <ul style="list-style-type: none"> ➤ Learn mathematical concepts required for understanding physical chemistry. ➤ Understand concepts behind solid, liquid and gaseous states of matter. ➤ Understand colloids, macromolecules and concepts behind catalysis and its applications.
		After successful completion of course a Student should be able to

	Chemistry-II (Inorganic Chemistry)	<ul style="list-style-type: none"> ➤ Understand Comparative study of elements Gr. 13-17 elements ➤ Learn trends in periodic properties, allotropy, Inert pair effect. ➤ Understand Chemical properties of the noble gases, chemistry of Xenon, structure and bonding in Xenon compounds. ➤ Understand Solubility product and common ion effect. Use of borax, cobalt nitrate, sodium carbonate, hydrogen sulphide, ammonium chloride and yellow ammonium sulphide. ➤ Understand Detection of following acid radicals in presence of each other: CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^-, Br^- and I^-
	Lab Course:	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Physical Chemistry Viscometer ➤ Learn about Taglamometer ➤ Understand Semi Micro Qualitative Analysis.
B. Sc. II. (Sem. -III)	General Chemistry-I (Organic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Learn study preparations, reactions and mechanisms ➤ Understand properties, acidic and basic Nature, of Alcohols, Phenols, Aldehydes, ketones and carboxylic acid. ➤ Understand study properties, acidic and basic Nature, of Organic compound of Nitrogen and their synthesis.
	General Chemistry-II (Physical Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Thermodynamic ➤ First law of thermodynamics ➤ Learn Calculation of W, q, du and dH ➤ Hess's law of heat Summation and its application.
	Lab Course:	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Organic Chemistry: Organic Derivatives Preparation, crystallization and physical constant ➤ Understand Physical Chemistry to determine the equilibrium constant for the reaction.



B. Sc. II. (Sem.-IV)	General Chemistry-I (Physical Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Second law of ➤ Learn Concept of Entropy ➤ Learn Gibbs and Helmholtz Function: Gibbs Function (G) and Helmholtz Function ➤ Understand Thermodynamic Quantities.
	General Chemistry- II (Inorganic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Condition for the formation of molecular orbitals ➤ Understand linear Combination of atomic orbitals methods to obtain molecular orbitals. ➤ Understand Chemistry of transition element(3d). ➤ Understand IUPAC nomenclature ➤ Learn about Stereoisomerism ➤ Understand treatment of precipitates in gravimetry ➤ Understand different classification of Acid and Bases
	Lab Course:	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand gravitation Estimation of Barium gravimetrically as Barium-Sulphate. ➤ Understand estimation of Ferrous gravimetrically as Fe₂O₃ ➤ Understand estimation of Zinc gravimetrically as Zinc Pyrophosphate (Zn₂P₂O₇). ➤ Understand estimation of Barium gravimetrically as Ba-Chromate (BaCrO₄) ➤ Understand estimation of Nickel gravimetrically as Ni-DMG ➤ Understand Physical Chemistry to determine normality and strength.
	General Chemistry-I	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand elementary quantum mechanics. ➤ Learn about quantum numbers



B. Sc. III. (Sem.-V)	(Physical chemistry)	<ul style="list-style-type: none"> ➤ Understand Photochemistry ➤ Understand qualitative description of fluorescence, phosphor fluorescence, non-radioactive process, quantum yield, photosynthesized reaction. ➤ Understand spectroscopy ➤ Understand physical properties and molecular
	General Chemistry- II (Organic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand details about Synthetic dyes and drugs ➤ Understand organomagnesium compound ➤ Understand Fats, Oils And Detergents
	General Chemistry- III (Inorganic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Solid state chemistry ➤ Understand superconductivity ➤ Understand chemistry of actinides, uranium and plutonium, applications. ➤ Understand Organometallic chemistry
	General Chemistry- IV (Analytical Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand qualitative and quantitative analysis ➤ Understand UV -visible Spectroscopy and Absorption spectroscopy ➤ Understand Beer's, Lambert's law and Lambert's Beer's law. ➤ Understand titrimetric method ➤ Understand Conductmetric titration and potentiometric titration. ➤ Understand Method of separation.
	Lab	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand determine the energy of activation for the acid catalyzed hydrolysis of methyl acetate



	Course:	<ul style="list-style-type: none"> ➤ Determine the strength of given strong acid (HCl) By potentiometric ➤ Understand investigate the kinetics of iodination of acetone ➤ Understand Binary mixture ➤ Understand inorganic Chemistry complex metric titration ➤ Understand Estimation of Hardness of water sample ➤ Understand to verify Lambert-Beers Law using Methyl Orange.
B. Sc. III. (Sem.-VI)	General Chemistry-I (Physical Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand colligative properties of dilute ➤ Understand osmotic pressure Vant'Hoff eq. for osmotic pressure, ➤ Understand nuclear chemistry ➤ Understand secondary cells lithium ion cell. Fuel Cells, Solar cell and biomass energy. ➤ Understand Hydrogen : fuel of the future, production of hydrogen and advantage. ➤ Understand Surface chemistry: Types of Adsorption, Langumir's adsorption isotherm. B. E. T. eq.
	General Chemistry-II (Organic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand Heterocyclic compound ➤ Learn Electrophilic substitution ➤ Understand carbohydrates ➤ Understand Synthetic polymere ➤ Understand Spectroscopy and infrared spectroscopy.
	General Chemistry-III (Inorganic Chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand metal ligand bonding in TM complex ➤ Understand electronics spectra of TM complex ➤ Understand thermodynamics and kinetic stability of complexes.



		<ul style="list-style-type: none"> ➤ Understand Bioinorganic Chemistry ➤ Understand Catalysis by transition metals complexes
	General Chemistry- IV (Analytical chemistry)	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand optical methods ➤ Understand Methods of separation ➤ Understand Miscellaneous Concept of quality, quality control, quality assurance, ISO series, good laboratory practices. ➤ Understand Turbidimetry and Nephelometry
	Lab Course:	<p>After successful completion of course a Student should be able to</p> <ul style="list-style-type: none"> ➤ Understand to determine the amount of Fe present in the given solution using salicylic acid by colorimetric titration. ➤ Understand to determine the order of reaction between K₂S₂O₈ and KI by fractional change method. ➤ Understand to determine empirical formula of Ferric-5-sulphosalicylate. ➤ Understand determine the amount of Fe²⁺ in the given solution potentiometrically. ➤ Understand to determine the refractive indices of series of salt solutions and to find out concentration of the salt in given unknown solution. ➤ Understand estimation of nitro group by reduction. ➤ Understand to prepare tetramine Copper(II) sulphate, bis (ethylene diamine) Copper (II) sulphate tris (ethylenediamine) Nickel(II) thiosulphate. Tris (acetylacetonato) Iron(III). Bis (8-hydroxy quinolinato) Magnesium (II). ➤ Understand estimation of Saline from Dextrose Saline by Mohr's Method.




 Principal



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Department of Chemistry (PG)


Program Specific Outcomes (PSOs)

The college has clearly stated learning outcomes in its vision and mission statement. Aims and objectives are clearly defined and stated by the college. The faculty and the students are made aware of the learning outcomes for all the programmes taught. Details are as follows:

- Learning outcomes for all the programmes taught are clearly stated in syllabi itself.
- Syllabi of every programme with aims and objectives, content of the course, reference books, pattern of examination and expected learning outcomes is given to the students by the faculty. It is also made available on the college and University websites.
- The students are made aware of the learning outcomes through the Principal address in the beginning of the academic year.

1. The specific outcome of this course is to enable students to acquire sufficient knowledge and skills related to Analytical chemistry.
2. The program specific outcome of this course is to enable students to acquire knowledge and skills and develop analytical approach for problem solving.
3. Further a research oriented learning that develops analytical and integrative problem-solving approaches.
4. Also to get hands on various preparations in Analytical chemistry with laboratory skills on preparation of various solutions, design of some reactions with its work up and isolation.
5. To create, select and apply appropriate techniques, resources and modern technology in multidisciplinary environment.




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List of courses offered during last five years (M. Sc.)





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Post Graduate

List of courses offered across all programs during last five years

Program code	Program Name	Course code	Course Name	Year of introduction
	F. Y. M. Sc. (Sem. I)	102101	Fundamentals of Analytical Chemistry	2014
		102102	Food and Biochemical Analysis	
		102103	Environmental Science	
		102104	Drug Laws & Packaging	
		102201	Lab Course	
		102202	Lab Course	
	F. Y. M. Sc. (Sem. II)	202101	Electro Analytical and Spectroscopic Methods	2014
		202102	Pharmaceutical Analysis	
		202103	Cosmetics Formulation & Quality Control	
		202104	Research Methodology	
		202201	Lab Course	
		202202	Lab Course	
	S. Y. M. Sc. (Sem. I)	302101	Advanced Chromatography and Spectroscopic Methods	2014
		302102	Organic Analysis	
		302103	Microbiological Methods of Analysis	
		302104	Medicinal Chemistry	
		302201	Lab Course	
		302202	Lab Course	
	S. Y. M. Sc. (Sem. II)	402101	Advanced Analytical Techniques	2014
		402201	Lab Course:	



[Signature]
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**Program outcomes, Program specific
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Department of Chemistry


Postgraduate Program Outcomes (POs)

- 1. Disciplinary Knowledge:** Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of a programme of study.
- 2. Critical Thinking:** Apply analytic thought to a body of knowledge, analyses and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence, identify relevant assumptions or implications, formulate coherent arguments, critically evaluate practices, policies and theories by following scientific approach to knowledge development.
- 3. Analytical Reasoning:** Demonstrate the ability to evaluate the reliability and relevance of evidence, identify logical flaws and holes in the arguments of others, analyses and synthesize data from a variety of sources, draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
- 4. Problem Solving:** Demonstrate capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge and apply one's learning to real life situations.
- 5. Research-related Skills:** Demonstrate a sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesising and articulating, demonstrate the ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships, plan, execute and report the results of an experiment or investigation.
- 6. Scientific Reasoning using Quantitative/Qualitative Data:** Demonstrate the ability to understand cause-and-effect relationships, define problems, apply scientific principles, analyse, interpret and draw conclusions from quantitative/qualitative data, and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- 7. Communication Skills:** Ability to share thoughts and ideas effectively in writing and orally, communicate with others using appropriate media, confidently share one's views and express herself/himself, demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
- 8. Collaboration/Cooperation/Team work:** Demonstrate ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated effort on the

part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

9. **Information/Digital Literacy:** Demonstrate capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis of data.
10. **Self-Directed Learning:** Demonstrate ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
11. **Moral and Ethical Awareness/Reasoning:** Demonstrate the ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Demonstrate the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, appreciate environmental and sustainability issues, and adopt objective, unbiased and truthful actions in all aspects of work.
12. **Lifelong learners:** Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling in all areas of respective subjects.




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Department of Chemistry (PG)

Course outcome (COs)

Name of the Class	Course Title	Course Outcome
M. Sc. I. General Chemistry (Sem.-I)	Fundamentals of Analytical Chemistry	<p>After completion of course learners can know about:</p> <ul style="list-style-type: none"> ➤ Analytical Basics: <ol style="list-style-type: none"> a) Analytical chemistry b) Sampling c) Chemo metrics Topics to be covered in the form of numerical problems ➤ Volumetric Methods of Analysis ➤ Separation Methods: <ol style="list-style-type: none"> a) Solvent extraction b) Solid Phase Extraction c) Planer Chromatography d) HPTLC conversion of TLC to quantitative measurements, densitometric detectors, fluorimetric detectors. ➤ Statistics: Fundamentals of Analytical Chemistry
	Food and Biochemical Analysis	<p>After completion of course learners can know about:</p> <ol style="list-style-type: none"> a) Regulations & Legislation of Food b) Food Additives & Preservatives c) Food Quality Parameters. d) Biochemical analysis food e) Body profile: Liver profile, Renal profile, Thyroid profile. f) Food analysis
	Environmental Science	<p>After completion of course learners can know about:</p> <ul style="list-style-type: none"> ➤ Air pollution ➤ Water pollution ➤ Methods of control of air pollution: ➤ Methods of control of water pollution:

		<ul style="list-style-type: none"> ➤ Sampling & analysis of air and water pollutants: ➤ Radiation pollution ➤ Environmental toxicology
	Drug Laws & Packaging	<p>After completion of course learners can know about:</p> <ul style="list-style-type: none"> ➤ Legislation and Regulation of Drug ➤ Prevention of Food Adulteration Act & Rules (PFA 1954) ➤ Statutory status of pharmacopoeia: ➤ Pharmacopoeia ➤ Food Standard Laboratories ➤ Packaging materials
	Lab Course:	<p>After completion of course learners can know about:</p> <ul style="list-style-type: none"> • Preparation and Standardization of commonly used titrants, Acid-base titration, redox titration, complex metric titration, Precipitation titration, Non-aqueous titrations. • Separation and estimation of elements • Milk and Milk Products, Tea, Coffee, Honey, Preservatives. Jam, Jelly, Squash, Edible Oil, Pickle, Sauce, Vinegar
M. Sc. I. General Chemistry (Sem.-II)	Electro Analytical and Spectroscopic Methods	<p>After completion of course learners can know about:</p> <ul style="list-style-type: none"> ➤ Electro Analytical Methods- I <ul style="list-style-type: none"> a) Potentiometry b) Ion Selective electrodes ➤ Electro analytical methods- II <ul style="list-style-type: none"> a) Polarography b) Stripping Methods of analysis c) Coulometry d) UV-Visible molecular Absorption Spectroscopy e) Atomic absorption Spectrometry f) Molecular IR absorption Spectroscopy g) Emission Spectroscopic methods h) Molecular Fluorescence spectroscopy i) Flame emission spectroscopy j) Turbidimetry and Nephelometry
	Pharmaceutical Analysis	<p>After completion of course learners can know about</p> <ul style="list-style-type: none"> a) Active Pharmaceutical Ingredients (API) and drug products b) Dosage form c) Control release formulation



		<p>d) Introduction to Pharmacopoeia and its importance</p> <p>e) Application of analytical techniques in pharmaceutical industries</p> <p>f) Assay of main classes of drugs Chemotherapeutic agents</p> <p>g) Dissolution and Disintegration</p> <p>h) Quality Assurance (QA), Quality Control (QC) - Change control management, Out of specifications (OOS), Deviation reporting, Stability studies (QA Pharma), Quality control, laboratory responsibilities, routine controls, Calibration of instruments, Standard test procedures.</p>
	Cosmetics Formulation & Quality Control	<p>After completion of course learners can know about</p> <p>a) Introduction cosmetics</p> <p>b) Herbal Cosmetics products</p> <p>c) Test methods for cosmetic products</p> <p>d) Quality control of Cosmetics raw materials</p> <p>e) Analysis of cosmetics</p>
	Research Methodology	<p>After completion of course learners can know about</p> <p>a) Fundamental Laboratory Techniques</p> <p>b) The investigative approach</p> <p>c) Analysis and presentation of data</p> <p>d) Statistical Packages for Social Science (SPSS) Workshop.</p> <p>e) Chemical safety</p> <p>f) Disaster Management:</p>
	Lab Course:	<p>After completion of course learners can know about</p> <ul style="list-style-type: none"> • Colorimetric analysis of elements, Mixture, Simultaneous estimation of metals, pk value of indicator by Spectrophotometry. • Colorimetric analysis of elements, Mixture, Simultaneous estimation of metals, pk value of indicator by Spectrophotometry. • Assay of alkaloids, Vitamins, Antibiotics, Sulpha drugs, Anta-acids, Anti-bacterial. • Dissolution test, Disintegration test, Weight variation test, Test for uniformity of content.
M. Sc. II (Sem. -III)	Advanced Chromatography and Spectroscopic Methods	<p>After completion of course learners can know about</p> <ul style="list-style-type: none"> ➤ Column Chromatography I <ul style="list-style-type: none"> a) Gas chromatography ➤ Column chromatography II <ul style="list-style-type: none"> a) High performance Liquid Chromatography (HPLC) ➤ Advanced Spectroscopic Methods I <ul style="list-style-type: none"> a) Mass spectrometry b) Atomic Emission Spectroscopy Inductively Coupled Plasma c) Nuclear Magnetic Resonance d)



		Advanced Spectroscopic Methods II a) Raman spectroscopy b) Hyphenated Methods i. Gas Chromatography – Mass Spectrometry (GC-MS) ii. Gas Chromatography – IR Spectrometry (GC-IR) iii. Liquid Chromatography – Mass Spectrometry (LC-MS) iv. Tandem Mass Spectrometry (MS-MS) v. Inductively Coupled Plasma – Mass Spectrometry (ICP-MS).
	Organic Analysis	After completion of course learners can know about a) UV-visible Spectroscopy b) IR-Spectroscopy c) CNMR d) Mass Spectroscopy e) Functional group analysis f) Nanotechnology g) Organic synthesis h) Organic trace analysis i) Micro-elemental analysis of C,H,N,O and halogens.
	Microbiological Methods of Analysis	After completion of course learners can know about a) Introduction of Microorganisms b) Staining method c) Viruses d) Bacteria e) Culturing of Microorganism f) Control of microorganism g) Food borne diseases h) Water-borne diseases i) Airborne diseases:
	Medicinal Chemistry	After completion of course learners can know about a) Antiseptic and disinfectants b) Chemotherapeutic agents; thermotherapy of acid fast infection (Anti-tubercular and anti- leprotic agents) c) Chemotherapeutic agents of parasitic infection, antimalarials, anti-amoebic, anti-trypanosomiasis and antihelmintic agents d) Antifungal agents e) Anti-viral agents f) Anti-neoplastic agents. g) Antibiotics h) Sulphonamides i) Diuretics j) Hypoglycemic agents k) Diagnostic agents and pharmaceutical aids l) Miscellaneous drugs like anticoagulants and antilipemic agents. m) Drugs acting on central nervous system



		n) Drugs acting on nervous system:
	Lab Course:	<p>After completion of course learners can know about Spectroscopic determination of elements, Standard addition method and method of least squares, extractive photometry, photometric titration.</p> <ul style="list-style-type: none"> • Fluorometric determinations of organic compounds by Calibration curve, standard addition method. • Flame photometric determination of alkali metals by calibration curve method. • Identification: Alcoholic, phenolic carbonyl, carboxylic, ester, nitro, amino group, amide group, degree of unsaturation, hydrocarbons, olefins using sample spectra. • Estimation: Amines, phenols, aldehydes, ketones, Ester, amide, Carboxylic compounds.
M. Sc. II (Sem.-IV)	Advanced Analytical Techniques	<p>After completion of course learners can know about</p> <ul style="list-style-type: none"> ➤ Advanced Electro-analytical methods <ul style="list-style-type: none"> a) Amperometric Titrations b) Biamperometric Titrations c) Modified Polarographic Methods ➤ Thermal & Radioactive methods of analysis <ul style="list-style-type: none"> a) Thermal methods (TGA, DTA & DSC) ➤ Thermometric Titrations <ul style="list-style-type: none"> a) Radio analytical Methods b) Isotope dilution method: Principle, Applications. ➤ Photo Acoustic Spectroscopy (PAS) ➤ Surface Analytical Techniques ➤ Surface spectroscopic methods ➤ Auger electron spectroscopy ➤ Scanning Electron Microscopy ➤ Computers in Analytical chemistry ➤ Green Analytical Methods
	Lab Course:	<p>Learners can know about:</p> <ul style="list-style-type: none"> ➤ Conductometric titration of acids, bases, mixture of acids. pH metric titration of mixture of acids and selection of indicators for volumetric titration, pH metric titration of polybasic acids. ➤ Thermometric titrations of acids/bases ➤ Water Analysis of samples for hardness, dissolved oxygen, residual chlorine content ➤ Analysis of Cosmetics intermediates.

