

❖ **PROGRAMME OUTCOMES(PO'S)**

PO- 1 Eligibility and Employability.

Main outcome of the programme is that after the course graduates become essentially eligible for employment in government as well as private sectors, create capability to acquire any reputed professional career in country and abroad. They will attain eligibility to successfully pursue their career objectives in advanced education, scientific career in government or industry, a teaching career in the school systems, or in a related career following post graduation.

PO- 2 Logical and Analytic Thinking Ability

The graduate will acquire scientific temperament to analyze any problem he comes across by demonstrating logical and analytic thinking ability. The graduate will analyze situations, search for the truth and extract information, formulate and solve problems in a systematic and logical way. Become able to identify assumptions and checking out the degree to which these assumptions are accurate and valid. The assumptions are framed to learn thinking and actions.

PO-3 Communication efficiency.

The graduate will work and communicate efficiently in inter-disciplinary environment, either independently or in a team, and demonstrate leadership quality. Bachelors will speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO-4 Life-Long Learning

The graduate will understand the impact of science on society; will engage in life-long learning and professional development through self-study, continuing education or professional and doctoral level studies. The graduate will acquire proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

PO-5 Achievement of Earning

The science graduate will be able to perform job in diverse fields such as science, engineering, survey, education, banking, development-planning, business, public service, self-employment etc. where qualities of precision, analytical mind, logical thinking, clarity of thoughts and expression, systematic approach, qualitative and quantitative decision are required.

PO-6 Social Interaction and Effective citizenship

Graduates will elicit views of others, mediate disagreement and help reach conclusions in group settings. Demonstrate empathetic social concern and equity centered national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PSO-7 Ethics

They become learned to recognize value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PSO-8 Environment and Sustainability.

Graduates will understand the issues of environmental contexts and sustainable development.

Scheme For Choice Based Credit System (CBCS) in Bachelor of Life Science Annual Pattern					
Year	Discipline specific Core course	Ability Enhancement Compulsory Course	Skill Enhancement Courses	Discipline Specific Elective	Total Credit
I	DSC-1A = 6 Credit DSC-1B = 6 Credit DSC-2A = 6 Credit DSC-2B = 6 Credit DSC-3A = 6 Credit DSC-3B = 6 Credit Credits = 36	English = 4 Credit Environ = 4 Credit Credits = 08	-----	----	44
II	DSC-1C = 6 Credit DSC-1D = 6 Credit DSC-2C = 6 Credit DSC-2D = 6 Credit DSC-3C = 6 Credit DSC-3D = 6 Credit Credits = 36	-----	SEC-1 = 4 Credit SEC-2 = 4 Credit	-----	44
III	-----	-----	SEC-3 = 4 Credit SEC-4 = 4 Credit Credits = 08	DSE-1A = 6 Credit DSE-1B = 6 Credit DSE-2A = 6 Credit DSE-2B = 6 Credit DSE-3A = 6 Credit DSE-3B = 6 Credit Credits = 36	44
Total Credits in B.Sc. Life Science =				44 × 3 = 132	
General Structure with; A- Botany; B- Zoology and C- Chemistry.					

B.Sc. LIFE SCIENCE GENERAL COURSE STRUCTURE		
Type of course	Courses	Credit
I. CORE COURSE	(12 Papers) 04 Courses from each of the From 03 disciplines of choice (Botany, Chemistry & Zoology.)	$12 \times 4 = 48$
Core Course Practical / Tutorial	(12 Practical/ Tutorials) 04 Courses from each of the From 03 Disciplines of choice (Botany, Chemistry & Zoology.)	$12 \times 2 = 24$
II. DISCIPLINE SPECIFIC COURSE ELECTIVE COURSE	(6 Papers) Two papers from each discipline of choice including paper of interdisciplinary nature.	$6 \times 4 = 24$
Discipline Specific Course Practical / Tutorials.	(6 Practical / Tutorials) Two Papers from each discipline of choice including paper of interdisciplinary nature.	$6 \times 2 = 12$ (if dissertation opted in any one of the three discipline than credits will be $5 \times 2 = 10$)
III. ABILITY ENHANCEMENT COURSES: 1.Ability Enhancement Compulsory.	2 Papers of 4 credits each Environmental Science English/MIL Communication	$4 \times 2 = 8$
2.SKILL ENHANCEMENT COURSE (Skill Based)	4 Papers of 4 credits from 03 disciplines.	$4 \times 4 = 16$
Total	42 papers (Theory + Practical + Tutorial)	132

B.Sc. LIFE SCIENCE DETAILED COURSE STRUCTURE						
Course Code	Course Title	Credit	ESE	CCA	Max. Marks	Exam Duration Hours.
YEAR-I						
Ability Enhancement Compulsory Course-I ENVS – 1 AECC 02	Environmental Science	4	70	30	100	3
Ability Enhancement Compulsory Course-II English, ENGL 103 /Hindi 103/SKT103	English	4	70	30	100	3
DSC Botany-I BOTA 101	Biodiversity (Microbes, Algae, Fungi and Archegoniate)	4	50	30	80	3
Practical BOTA 101	Biodiversity (Microbes, Algae, Fungi and Archegoniate)	2	20	-	20	3
DSC Zoology-I ZOOL 101TH	Animal Biodiversity	4	50	30	80	3
ZOOL 101PR	Animal Biodiversity	2	20	-	20	3
DSC-Chem.-1 CHEM 101TH	Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons	4	50	30	80	3
CHEM 101PR	Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons Lab	2	20	-	20	3
DSC-Botany -II BOTA 102	Plant Ecology and Taxonomy	4	50	30	80	3
Practical BOTA102	Plant Ecology and Taxonomy	2	20	-	20	3
DSC-Zoology -II ZOOL102TH	Comparative Anatomy and Developmental Biology of Vertebrates.	4	50	30	80	3
ZOOL102PR	Comparative Anatomy and Developmental Biology of Vertebrates.	2	20	-	20	3
DSC Chemistry-2 CHEM 102 TH	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry.	4	50	30	80	3
CHEM102 PR	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	2	20	-	20	3
Total		44			80	
YEAR-II						
DSC Botany-III BOTA201	Plant Anatomy and Embryology	4	50	30	80	3
Practical BOTA201	Plant Anatomy and Embryologyd	2	20	-	20	3

DSC Zoology -III ZOOL201 TH	Physiology and Biochemistry	4	50	30	80	3
ZOOL201 PR	Physiology and Biochemistry	2	20	-	20	3
DSC Chemistry- III CHEM 201TH	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry	4	50	30	80	3
CHEM 201 PR	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry Lab.	2	20	-	20	3
Skill Enhancement Course SEC-I BOTA 203 OR ZOOL 203TH Or CHEM 203 OR CHEM 204	Bio-Fertilizers OR Medical Diagnostics Basic OR Basic Analytical Chemistry OR Fuel Chemistry and Chemistry of Cosmetics and Perfumes	4	70	30	100	3
SEC-II BOTA 204 OR ZOOL 204TH	Gardening and Floriculture OR Apiculture	4	70	30	100	3
DSC Botany-IV BOTA 202	Plant Physiology and Metabolism	4	50	30	80	3
Practical BOTA 202	Plant Physiology and Metabolism	2	20	-	20	3
DSC Zoology-IV ZOOL 202 TH	Genetics and Evolutionary Biology	4	50	30	80	3
ZOOL 202 PR	Genetics and Evolutionary Biology	2	20	-	20	3
DSC Chemistry IV CHEM 202TH	Chemistry of Main Group Elements, Chemical Energetics and Equilibria	4	50	30	80	3
CHEM 202PR	Chemistry of Main Group Elements, Chemical Energetics and Equilibria	2	20	-	20	3
Total		44			80	
YEAR-III						
DSE-Botany I (BOTA 301) OR (BOTA 302)	Economic Botany & Biotechnology OR Analytical Techniques in Plant Sciences	4	50	30	80	3
Practical (BOT A301) OR (BOTA 302)	Economic Botany & Biotechnology OR Analytical Techniques in Plant Sciences	2	20	-	20	3
DSE-Zoology I	Applied Zoology	4	50	30	80	3

ZOOL 301(A)TH OR ZOOL 301 (B)TH OR ZOOL 301 (C)TH	OR Animal Biotechnology OR Aquatic Biology					
ZOOL 301(A)PR OR ZOOL 301(B)PR OR ZOOL 301(C)PR	Applied Zoology OR Animal Biotechnology OR Aquatic Biology	2	20	-	20	3
DSE -2A CHEM 301TH OR CHEM 302TH OR CHEM 303TH	Polynuclear hydrocarbons and UV, IR spectroscopy lab. OR Industrial Chemical and Environment OR Quantum chemistry, spectroscopy & Photochemistry	4	50	30	80	3
CHEM 301TH OR CHEM 302 OR CHEM 303	Polynuclear hydrocarbons and UV, IR spectroscopy lab. OR Industrial Chemical and Environment OR Quantum chemistry, spectroscopy & Photochemistry	2	20	-	20	3
DSE-Botany II BOTA303 OR BOTA 304	Cell and Molecular Biology OR Bioinformatics	4	50	30	80	3
BOTA303 OR BOTA 304	Cell and Molecular Biology OR Bioinformatics	2	20	-	20	3
DSE- Zoology- II ZOOL 302(A)TH OR ZOOL 302(B)TH Or ZOOL 302 (C)TH	Insect, Vector and Diseases OR Immunology OR Reproductive Biology.	4	50	30	80	3
ZOOL 302(A)PR OR ZOOL 302(B)PR OR ZOOL 302(C)PR	Insect, Vector and Diseases OR Immunology OR Reproductive Biology	2	20	-	20	3
DSE-2B Chemistry-II CHEM 304TH OR CHEM 305TH OR CHEM 306TH	Chemistry of Transition and Inner transition Elements, Cordination Chemistry, Elements, Theories of Acids and Bases Lab. OR Polymer Chemistry Lab. OR Molecules of Life Lab.	4	50	30	80	3

CHEM 304PR OR CHEM 305PR OR CHEM 306PR	Chemistry of Transition and Inner transition Elements, Coordination Chemistry, Elements, Theories of Acids and Bases Lab. OR Polymer Chemistry Lab. OR Molecules of Life Lab.	2	20	-	20	3
SEC-III BOTA 306 OR ZOOLOGY 303 TH	Medicinal Botany and Ethnobotany OR Sericulture	4	70	30	100	3
SEC-IV (BOTA307) OR ZOOLOGY 304(A) TH OR ZOOLOGY 304(B) TH CHEM 307 OR CHEM 308	Mushroom Cultivation Technology OR Aquarium Fish Keeping OR Research Methodology OR Chemical Techniques and Society and Business skills for Chemistry OR Pesticide chemistry and Pharmaceutical chemistry					
Total		44			800	
Total year I,II& III		132			2400	

B.SC.LIFE SCIENCES COURSES OUTCOMES.

Paper Code	Paper Title	Course Outcome
Ability Enhancement Compulsory Course – I ENVS -1AECC 02	Environmental Science	These courses are the courses based upon the content that leads to Knowledge enhancement. And are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills etc. in English and/Hindi and Environment science.
Ability Enhancement Compulsory Course-II English ENGL 103 /Hindi 103/SKT103	English	These courses are the courses based upon the content that leads to Knowledge enhancement. And are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills etc. in English and/Hindi and Environment science.
DSC Botany I BOTA 101	Biodiversity(Microbes, Algae, Fungi and Archegoniate)	<ul style="list-style-type: none"> • General structure of bacteria and viruses and their mode of reproduction. • Classification of algae, fungi, archegoniate: (bryophytes, pteridophytes, gymnosperms) • Economic & ecological importance of algae, fungi & archegoniate. • Morphology and life cycle of <i>Nostoc</i>, <i>Chlamydomonas</i>, <i>Oedogonium</i>, <i>Vaucheria</i>, <i>Ectocarpus</i>, <i>Polysiphonia</i> (algae); <i>Phytophthora</i>, <i>Rhizopus</i>, <i>Penicillium</i>, <i>Ventura</i>, <i>Puccinia</i>, <i>Agaricus</i>, (fungi); <i>Marchantia</i>, <i>Funaria</i>, <i>Sillaginella</i>, <i>Equisetum</i>, <i>Adiantum</i>, <i>Cycus</i> & <i>Pinus</i> (Archegoniate) • Transition plants from aquatic to terrestrial habitat. • Symbiotic relationships :Lichens & Mycorrhiza • Stellar evolution in the Pteridophytes. • Fossil Pteridophytes: <i>Rhynia</i> & <i>Cooksonia</i> . • Classify and differentiate the specimens of thallophyta and archegoniate. • Identify the algae, fungal & bacterial diseases of plants by the external feature.
DSC Zoology- I ZOOL 101TH	Animals Biodiversity	<p>Students should be able to know the following</p> <ul style="list-style-type: none"> • Classification of all the non chordate phylums and general characters • Locomotory organelles and locomotion in protists • Canal system of <i>sycon</i> • Life cycle of <i>taenia solinum</i> , <i>asceris</i> • Metamerism in annelida, vision in astropoda, torsion in gastropods, water vascular system in asteroidea general characters & classification of protochordates, fishes, amphibia, reptilia,

		<p>aves & mammals.</p> <ul style="list-style-type: none"> • The students should be able to classify and differentiate between various of non chordates
DSC-Chem.-I CHEM 101TH	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons	<ul style="list-style-type: none"> • Knows about Atomic structure quantum model. Bohrs Theory and its limitations, Schrodinger Wave Equation and its function, quantum numbers. Slater rules and its applications and limitations. • Lattice energy and its application, Born-Haber cycle and its application. Shapes of molecules on the basis of valence bond theory and valence shell electron pair repulsion theory. • Explains ionic and covalent bonding with VBT and VESPER Theory and • Detailed description of Molecular orbital theory with homonuclear and heteronuclear diatomic molecules. • Physical effects and electronic displacement in organic molecules. • Reactive intermediates. • Conformational, optical and geometrical type of stereoisomerism and assignment of configuration • Preparation reaction and structure of alkenes, alkenes and alkynes. • Students will also know and recall the fundamental principles of organic chemistry that include chemical bonding, nomenclature, structural isomerism, stereochemistry, chemical reactions and mechanism.
DSC-Chem.-I CHEM 101TH	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons Lab	<ul style="list-style-type: none"> • Experimentally performs volumetric determination by neutralisation and redox titrations this provokes analytical skills in students. • In organic qualitative analysis to detect the extra element nitrogen, sulphur and halogens present in the organic compound • To separate the mixture by chromatography prepares students to learn separations using this technique in industrial as well as medical areas. • Students will employ critical thinking to carry out, record and analyze the results of chemical experiments. They will demonstrate proficiency in the use of appropriate instrumentation to collect and record data from chemical experiments.

DSC-Botany II BOTA 102TH	Plant Ecology and Taxonomy	<ul style="list-style-type: none"> • To nomenclature, classify and identify the various plants • Herbarium – its functions, important herbaria and botanical gardens of world and India • Various banks, categories and taxonomic groups • Taxonomic evidences from palynology, cytology, photochemistry and molecular data. • To study about various phytogeographical zones • The various biotic and abiotic factors of ecosystem • Various plant communities • Knowledge of food chain, food web, ecological pyramids and biochemical cycles • Succession & its mechanism. • Flow of energy in various trophic levels. • To identify, classify and nomenclature of various angiospermic flowering plants in their surrounding • How various factors of ecosystem effect biotic and abiotic factors • How energy flows from one trophic level to other • Know about the pioneer communities, succession & mechanism. • History of plant systematic and basics of classification. • Working knowledge of ecological sampling & consequences of environmental problems
DSC-Zoology II ZOOL102TH	Comparative Anatomy and Developmental Biology of Vertebrates	<ul style="list-style-type: none"> • Knowledge of integumentary system • Evolution of visceral arches • Brief idea of elementary canal and its glands • Brief account of different respiratory organs • Evolution of aortic arches & heart • Succession of kidneys • Structure of brain in different vertebrates classes • Brief idea of sensory organs • Development of embryos, placenta in mammals. • Meta morphosis in frog. • The students were imparted knowledge regarding above said objectives, which were testify through the oral tests, class tests, house tests etc.
DSCChem.-2 CHEM 102 TH	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	<ul style="list-style-type: none"> • Basic laws and principles of Thermodynamics make students to understand working of engines, machines, radiators and also different types of power plants.

		<ul style="list-style-type: none"> Detailed description of chemical equilibrium, Concepts of weak and strong electrolyte and Buffer solution impart insight to understand solution chemical properties. Preparation, Chemical reaction, chemical properties and electrophilic substitution of aromatic hydrocarbon. Preparation and chemical reaction of Alkyl halide, alcohol and phenol, aldehydes and ketones root into the understanding of their physical and chemical properties.
CHEM 102 PR	States of Matter, Chemical Kinetics & Functional Group Organic Chemistry	<ul style="list-style-type: none"> Enthalpy of neutralization of HCl with NaOH, ionization of acetic acid and hydration of copper sulphate. Heat capacity of calorimeter. The students develop keen interest in the basic concepts of thermodynamics. To determine the pH value of different solution using pH-meter and preparation of the buffer solution, measurement of their pH-values imbibes the deep knowledge of pH and its role in our daily life. The synthesis and purification of the organic compounds by crystallization and distillation are designed to develop synthetic and purification skills in students.
YEAR-II		
DSC Botany-3 BOTA 201	Differential Equations	<ul style="list-style-type: none"> Understands basic definitions and terminology associated with ordinary differential equations. Learn rules to find integrating factors. Distinguish between linear and non linear, ordinary and partial differential equations. Recognize and solve homogeneous and non homogeneous equations by different methods Students are able to apply the methods of variation of parameters and reduction of order. Use working to determine linear dependence and linear independent of functions. Learns to solve Cauchy Euler's equations. Learn the concepts of total differential equations. Can form partial differential equations of first order and use Langrange's methods to solve partial differential equations. Are able to find solutions of partial differential equations by Charpit's method. Learn to classify second order partial differential equation through lustration only.
DSC Zoology 3 ZOOL201 TH	Physiology and Biochemistry	<ul style="list-style-type: none"> Structure of neuron, origin & propagation of nerve impulse Physiology of digestion, reproduction, pulmonary respiration,

		<p>transport of oxygen & carbon dioxide</p> <ul style="list-style-type: none"> • Structure of nephron, composition of blood • Structure and function of endocrine glands & enzymes. • Metabolism of carbohydrates, lipids & proteins
DSC Chem.III CHEM 201TH	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry	<ul style="list-style-type: none"> • Concept of Ideal and non ideal solutions with their definitions distillation of solution. • Distributions law and its application, Phase rule and its application to one and two component system, clausius clapeyron equation and its derivation. • Basic concept of electrochemistry he dropped and moving boundary method application • application of conductors measurement nearest equation and its importance to the different types of electrodes of equilibrium constant from EMF data potentiometric titration • Preparations physical and chemical properties of carboxylic acids and their derivatives, comparative study of nucleophilicity of acyl derivatives synthesis and naming reaction of amines. distinction between primary secondary and tertiary amines, preparations and convergence in diazonium salt, preparation and reaction of amino acid primary secondary tertiary and quaternary structure of proteins ,carbohydrates classification, properties and configurations structure of disaccharides and polysaccharides. • Able to understand ideal and non ideal solutions as well as their properties definition cause in them student come to know about the phase diagram system and the basic concept in phase equilibria. They come to know about electrochemistry themselves different type of conductometric potentiometric titration.
CHEM 201 PR	Solutions, Phase Equilibria , Conductance, Electrochemistry & Organic Chemistry Lab.	<ul style="list-style-type: none"> • Study of distribution law and its applications. • To determine cell constant and equivalent conductance of weak acids • To perform conductometric and potentiometric titrations • To estimate the given functional group present in an organic compound qualitatively. • With the help of these experiments students come to know about the advantage of conductometric and potentiometric titrations over visually performed titrations. • They can analyze the given organic functional group present in an organic compound

		qualitatively.
Skill enhancement course SEC-I (BOTA 203) OR (BOTA 204) OR ZOOL 203 OR CHEM 203 OR CHEM 204	Bio-Fertilizers OR Herbal Technology OR Medical Diagnostics Basic OR Analytical Chemistry OR Fuel Chemistry and Chemistry of Cosmetics and Perfumes	<p style="text-align: center;">Medical Diagnostics Basic</p> <ul style="list-style-type: none"> • Medical diagnostics & its importance • Various diagnostic methods for analysis of blood, urine. • Knowledge of infectious diseases, tumors & their types, knowledge of medical imaging. • Knowledge of medical diagnostics methods, infectious diseases, tumor types and various medical imaging must be known by B.Sc students. <p style="text-align: center;">Analytical Chemistry</p> <ul style="list-style-type: none"> • Skill enhancement course are designed to increase the mental and experimental skills of students in chemistry. • Students know the analysis methods and analytical principles. • This course develops the analytical thinking and awareness, includes basic analytical terms and its applications to soil, food and environment. • A part of this course develops industrial skills and awareness regarding adulterations, contaminants and pollutants etc.
DSC Botany-IV BOTA 202 TH	Plant Physiology and Metabolism	Students were enabled to understand the following topics: <ul style="list-style-type: none"> • Plant water relations, transpiration, guttation and stomatal movement. • Mineral nutrition and their absorption and transport mechanisms. • Photosynthesis: pigments, photosystems, photophosphorylation, photorespiration . • Animal respiration: glucose breakdown pathways and energy synthesis. • Enzyme: structure, function and properties.
DSC Zoology-IV ZOOL 202 TH	Genetics and Evolutionary Biology	<ul style="list-style-type: none"> • Mendel's work, aspects of inheritance, linkage, crossing over, chromosomal mapping, & mechanisms of sex determination, mutations • Evolutionary theories & evidences Concept of species, macro evolutionary principles & mass extinction. • Course outcome : the students must have clear concept of the above said objectives

DSC Chem-IV CHEM 202TH	Coordination chemistry, States Matter & Chemical Kinetics	<ul style="list-style-type: none"> • General group trends within transition elements, lanthanides and actinides. • Detail description of Valence Bond, Crystal Field Theory, with special reference with C No. 4 and 6. • Transition elements play a crucial role in industrial catalytic processes that are required to produce substances and new materials at a rate far exceeding that of natural chemical reactions. • Detail description of Chemical Kinetics. Theories of Reaction Rates and their comparison.
CHEM 202PR	Coordination chemistry, States Matter & Chemical Kinetics Lab	<ul style="list-style-type: none"> • Semi-micro qualitative analysis of inorganic mixture. • Gravimetric estimation of metal ion. • Detail description of colorimetric, complexometric titrations and measurement of surface tension and viscosity. • Experimental study of chemical kinetics. • From this lab course students learn about analysis of unknown inorganic compounds, gravimetric estimation of metal ion, colorimetric, complexometric titration. • They also got knowledge about measurements of surface tension and viscosity and experimental study of kinetics of reaction by different methods.
SEC-II BOTA204 OR ZOOLOGY 204TH	Gardening and Floriculture OR Apiculture	<p style="text-align: center;">Apiculture</p> <ul style="list-style-type: none"> • History, classification & biology of honey bee • Artificial bee rearing & knowledge of bee keeping equipments & method of honey extraction • Knowledge of bee diseases & their control measures. • Knowledge of apiculture industry and entrepreneurship in apiculture. • Course outcome: The student must have the knowledge of apiculture, disease in bees & their control and utilization of apiculture to increase the benefits & income.
YEAR-III		
DSE-Botany I BOT A301 or BOTA 302	Economic Botany & Biotechnology OR Analytical Techniques in Plant Sciences	<p>Economic Botany & Biotechnology.</p> <ul style="list-style-type: none"> • Name of research centres and institute of Rice, Wheat, Maize, Potato. • Botanical description, cultivation practices, origin, distribution and economic importance of cereals, pulses, vegetables, diff. beverages, groundnut, sugarcane, spices, fibre yielding plant and medicinal plants. • Biotechnology: meaning, scope and

		<p>importance. Tissue culture technique and other biotechniques (vectors, transgenic plants, PCR, DNA fingerprinting).</p> <ul style="list-style-type: none"> • Students were able to explain the following topics: • Name and location of diff. research centres and institutes. • Botanical descriptions, plant cultivation practices, origin, distribution and economic importance of cereals, pulses, vegetables, diff. beverages, groundnut, sugarcane, spices, fibre yielding plant and medicinal plants. Tissue culture technique and other biotechniques (vectors, transgenic plants, PCR, DNA fingerprinting)
<p>DSE-Zoology-I ZOOL 302(A)TH OR ZOOL 302(B)TH Or ZOOL 302 (C)TH</p>	<p>Applied Zoology Or Animal Biotechnology OR Aquatic Biology</p>	<p style="text-align: center;">Aquatic Biology</p> <ul style="list-style-type: none"> • Breif Knowledge of Different aquatic biomes • Fresh water biology of lakes and streams • Biotic and abiotic characters • Study of components of marine biology • Causes of pollution of water and its preventing measures. • Students must have knowledge of aquatic biomes, fresh water, biotic & abiotic characters, marine biology and causes and prevention of pollution to their bodies.
<p>DSE -2A CHEM 301TH</p> <p>OR CHEM 302</p> <p>OR CHEM 303</p>	<p>Polynuclear Hydrocarbons and UV, IR spectroscopy lab.</p> <p>OR Industrial Chemical and Environment</p> <p>OR Quantum chemistry, spectroscopy & Photochemistry</p>	<ul style="list-style-type: none"> • Understand hetronuclear chemistry involving aromatic compound, their properties • Application of UV, IR spectroscopy in organic molecules to characterize organic molecules. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • This course develops skill to handle, use and storage of chemicals. Also create a alertness about the chemical toxicity and hazards. • Postgraduates learn the processes and principles involved in industrial metallurgy, pollution control. • The key notion of the environmental issues in chemical way is filled in this course. • There is also a brief introduction to biocatalysis and green chemistry and their role in industry. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • To understand the basic concepts of quantum chemistry • Introduction to spectroscopy and various types of spectra involved in it. • Concept of fluorescence and phosphorescence • Characteristics of electromagnetic radiation • Students become able to understand the

		<p>spectroscopy which is of useful significance to elucidate structure determination.</p> <ul style="list-style-type: none"> • They got about the concept of quantum yield, vibrations and energy transfer processes in excited states of molecules. Knowledge of quantum mechanics and its application is of extreme importance to scientists.
<p>CHEM 301PR</p> <p>OR</p> <p>CHEM 302PR</p> <p>OR</p> <p>CHEM 303 PR</p>	<p>Polymer Chemistry Lab or</p> <p>Industrial Chemical and Environment Lab</p> <p>or</p> <p>Quantum Chemistry, Spectroscopy &Photochemistry Lab.</p>	<p>CHEMDSE-501 P</p> <ul style="list-style-type: none"> • Polymer Synthesis & Characterization. • Determination of molecular weight by different methods. • Polymer synthesis provides a root to the formation of plastics, biosynthesis of proteins and highly polymeric carbohydrates. • Polymer Characterization is important for the synthesis of new materials their evaluation and improvement in performance. <p>OR</p> <p>CHEM DSE 502 P</p> <ul style="list-style-type: none"> • With the help of these experiments students become able to understand how to estimate the DO, COD, BOD. They can estimate the alkalinity of water using double titration methods. <p>OR</p> <p>CHEM DSE 503 (P)</p> <ul style="list-style-type: none"> • Students become able to apply the spectroscopy techniques. They can prove the validation of Beer's law experimentally and also apply the kinetics processes in acidic medium.
<p>DSE Botany-II BOTA 303</p> <p>OR</p> <p>BOTA 303</p>	<p>Cell and Molecular Biology</p> <p>OR</p> <p>Bioinformatics</p>	<p>Cell and Molecular Biology(BOTA 601)</p> <ul style="list-style-type: none"> • Basic technique in biology, cell organizations,. • Cell division: types and molecular control. • Genetic material and various experimental perspectives. • Gene expression and its regulation. • Students were able to explain the following topics: • Basic concepts of biology, different types of microscopes, different cells and their organelles. • How parental characters transferred to their progeny. <p>Bioinformatics</p> <ul style="list-style-type: none"> • Bio-informatics: introduction, scope and research areas. • Biological databases: intro., classification and retrieval system. • NCBI: databases, retrieval tool, sequence submission.

		<ul style="list-style-type: none"> • EMBL Bank: introduction and analysis tools. • DDBJ, PIR. • Concept of MSA, SCORING MATRICES, PAM, BLOSUM. • Molecular phylogeny. • Bioinformatic applications and software. • Students were able to explain the following topics: • Bio-informatics, Biological databases, NCBI, EMBL- Bank, • Analysis tools for EMBL- Bank, DDJB, PIR and MSA. • Molecular phylogeny.
<p>DSE- Zoology II ZOOOL 302(A)</p> <p>Or ZOOOL 302(B)</p> <p>OR ZOOOL 302 (C)</p>	<p>Insect, Vector and Diseases</p> <p>OR</p> <p>Immunology</p> <p>OR</p> <p>Reproductive Biology</p>	<p>Insect, Vector and Diseases</p> <ul style="list-style-type: none"> • General features and morphology of insects • Brief introduction of carrier of vectors • Classification of insects upto orders • Insect vectors causing diseases • Fleas and flea borne diseases • Human louse as vectors • Bugs as vectors. • Knowledge of insect morphology • Classification of class insect • Various vectors, their structure and the germs carried by them <ul style="list-style-type: none"> • Spread of diseases and prevention measures. <p style="text-align: center;">Immunology</p> <ul style="list-style-type: none"> • Basic concepts of immunology • Components of immune system • Haemopoiesis • Antigens and antibodies • Working of immune system • Immune system in health and diseases • Vaccines . • Basic Knowledge of Immunology • Constituents of immune system • Haemopoiesis • Knowledge of antigens and antibodies • Working of immune system • Relation of immune system with health <p style="text-align: center;">Reproductive Biology(ZOOOL603)</p> <ul style="list-style-type: none"> • Male and female reproductive organs • General hormones (male & female) and their working • Functional anatomy of male reproductive system of human & rat and function of different parts • Functional anatomy of female reproductive

		<p>system of human & rat and function of different parts</p> <ul style="list-style-type: none"> • Infertility in male & female • Various assisted reproductive technology • Modern contraceptive technologies. • Morphology and anatomy of male & female reproductive organs with their functional aspects • Gonadal hormones associated with reproduction in male & female. • Knowledge of infertility, various assisted technologies and modern contraceptive technologies in male and female.
<p>CHEM 304TH OR CHEM 305 OR CHEM DSE306</p>	<p>Chemistry of Main group Elements, Theories of acids and Bases or Organometallic, Bioinorganic Chemistry, Polynuclear Hydrocarbons and UV, IR Spectroscopy OR Molecules of Life</p>	<ul style="list-style-type: none"> • Basic concepts about acids and bases, HSAB concept and its application, Relative strength of acid and bases and effects of solvents and substituent on them. • Students become able to distinguish or classify the acidic and basic strength of different acids and bases respectively they come to know about anomalous behavior of hydrogen and its position and anomaly. • General Trends and characteristics of s and p block elements including detailed description of various properties. • Preparation properties and structure of important compound of noble gases. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Preparation, Classification of organometallic compound, detail description of metal carbonyls. • Introduction to bioinorganic chemistry, role of metal ions in biological system and stabilization of protein structure. • Understand heteronuclear chemistry involving aromatic compound, their properties • Application of UV, IR spectroscopy in organic molecules to characterize organic molecules. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Detail description of Carbohydrates, amino acids and Lipids. • Mechanism and factors affecting enzyme action and their specificity. Coenzymes and cofactors and their role in biological reactions. Enzyme inhibitors and their importance. Detail description of drug action. • Components of nucleic acids structure of polynucleotides. Biological roles of DNA and RNA. Detail description of concept of energy in biosystems.

<p>DSE-2B CHEM 304PR OR CHEM 305PR OR CHEM DSE306PR</p>	<p>Chemistry of transition and Inner transition Elements, Cordination Chemistry, Elements, Theories of Acids and Bases Lab.</p> <p>OR</p> <p>Polymer Chemistry Lab.</p> <p>OR</p> <p>Molecules of Life Lab</p>	<ul style="list-style-type: none"> • Basic concepts about acids and bases, HSAB concept and its application, Relative strength of acid and bases and effects of solvents and substituent on them. • Students become able to distinguish or classify the acidic and basic strength of different acids and bases respectively they come to know about anomalous behavior of hydrogen and its position and anomaly. • General Trends and characteristics of s and p block elements including detailed description of various properties. • Preparation properties and structure of important compound of noble gases. <p style="text-align: center;">OR</p> <p style="text-align: center;">Polymer Chemistry</p> <ul style="list-style-type: none"> • Classification and nomenclature chemical bonding and formation of polymers • Polymerization process functionality and texture of polymers. Bi and poly functional system. • Mechanism and kinetic of different types of polymerization and co polymerization, Detail description of crystallizations and crystallinity • Nature and structure of polymers and their properties. • Determination, distribution and significance of molecular weight of polymers. • Detail description of glass transition temperature • Detail description of polymer solution. • Physical, thermal flow and mechanical properties of polymers • Brief introduction, to preparation structure and properties application of various types of polymers. • Polymers are used in broad range of industries such as textiles; packaging, stationary, plastics, air craft, ropes, toys and construction to date the importance of polymer have been much more highlighted because of their application in different dominions of sciences technologies and industries for basic uses to biopolymers and therapeutics polymers. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • Detail description of Carbohydrates, amino acids and Lipids. • Mechanism and factors affecting enzyme action and their specificity. Coenzymes and cofactors and their role in biological reactions.
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		<p>Enzyme inhibitors and their importance. Detail description of drug action.</p> <ul style="list-style-type: none"> • Components of nucleic acids structure of polynucleotides. Biological roles of DNA and RNA. Detail description of concept of energy in biosystems.
<p>SEC-III BOTA 306</p> <p>OR ZOOLOGY 303 TH</p>	<p>Medicinal Botany and Ethnobotany</p> <p>OR Sericulture</p>	<p>Etanobotany</p> <ul style="list-style-type: none"> • Students were enabled to understand the following topics: • Ethnobotany: meaning, scope and objectives. • Ethnobotany: diff. methodology used. • Role of diff. plants in modern medicine. • Conservation of plant genetic resources and endangered taxa. • IPR, Traditional knowledge and how to protect plant ethnic groups.
<p>SEC-IV (BOTA307) Or ZOOLOGY 304(A) TH Or ZOOLOGY 304(B) TH</p> <p>CHEMISTRY 307 Or CHEMISTRY 308</p>	<p>Mushroom Cultivation Technology</p> <p>OR Aquarium Fish Keeping</p> <p>OR Research Methodology</p> <p>OR Chemical Techniques and Society and business skills for Chemistry</p> <p>OR Pesticide chemistry and Pharmaceutical chemistry</p>	<p>Rights Aquarium Fish Keeping Scope of Aquarium fish industry as a cottage industry</p> <ul style="list-style-type: none"> • Common characters of freshwater and marine fish cultures in aquarium • Composition of fish food • Fish handling during transportation <p>Maintenance of aquarium.</p> <ul style="list-style-type: none"> • General characters of fish • Composition of fish food • Preparation of fish aquarium • Maintenance of fish aquarium • Knowledge of fish cottage industry <p>Research Methodology Knowledge of various foundations of research</p> <ul style="list-style-type: none"> • How to design research and need • How to collect • Thesis writing along with preparation of tables • Various ethical issues related to research. <p>OR</p> <p>Chemical Technology and Society and Business skill for Chemist.</p> <ul style="list-style-type: none"> • Introduction to clean technology and scope of different types of equipment needed in chemical industries. • Exploration of societal, technological issues, chemical and scientific literacy. • Basic of business like business plans, market need and project management. • Role of chemistry in India and Global economies

		<ul style="list-style-type: none"> • Current challenges and opportunities for chemistry • Financial aspects of business with case studies • Concept of intellectual property and patents • Apply the knowledge in current challenges and opportunities for chemistry. <p style="text-align: center;">Pesticide Chemistry And Pharmaceutical Chemistry</p> <ul style="list-style-type: none"> • Introduction to pesticides, benefits and adverse effects of pesticides, structure activity relationship in pesticides; can easily be recognized by knowing about them. • Synthesis uses of pesticides in organochlorines, organophosphates, carbamates, anillides and quinines. • Synthesis of various classes of drugs, design and development.. • They come to know about synthesis of some vitamins.
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❖ PROGRAMME SPECIFIC OUTCOMES: CHEMISTRY

- ✓ **PSO-1** Graduates will have strong foundations in basic principles and theories of the main areas of the organic, inorganic, analytical, physical and biological chemistry and will be able to apply chemical knowledge in many applications.
- ✓ **PSO-2** After completion one will be able to solve problems by identifying the typical parts of a problem and works with a strategy. They could to apply appropriate techniques to achieve a solution, correctness and interpretation of calculated results.
- ✓ **PSO-3** Graduates will be to use computers in data acquisition and processing and use available software as a tool in data analysis. They could use modern library search tools to locate and retrieve scientific information about a topic, chemical, chemical technique, or an issue relating to chemistry.
- ✓ **PSO-4** B.Sc. Chemistry graduates know proper regulations and procedures for safe handling storage and use of chemicals. Hence will become eco-friendly and eco-protective, an ability to determine hazards associated with carrying out chemical experiments in terms of chemical toxicity, chemical stability and chemical reactivity and be able to find information to enable effective risk assessments to be carried out.
- ✓ **PSO-5** Understands the ethical, historic, philosophical, and environmental dimensions of problems.
- ✓ **PSO-6** Graduates will be able to use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments, as well as interpretation of data generated in instrumental chemical analyses upon completion of a B. Sc degree in Chemistry.
- ✓ **PSO-7** Learns skills in the employment of common conventions and standards in scientific writing, data presentation, and referencing literature; numeracy and mathematical skills, including handling data, algebra, functions, trigonometry, calculus, vectors and complex numbers, alongside error analysis, order-of-magnitude estimations, systematic use of scientific units and different types of data presentation.

❖ PROGRAMME SPECIFIC OUTCOMES (BIOSCIENCES)

- ✓ **PSO-1** Understands the nature of basic concepts of cell biology, biochemistry, Taxonomy and ecology.
- ✓ **PSO-2** Students be able analyse the relationship among animals, plants and microorganisms.
- ✓ **PSO-3** Understands the utility of biological sciences in apiculture, aquaculture, agriculture and medicine.
- ✓ **PSO-4** The students of Zoology and Botany do study some of the common courses and they have the technical knowledge regarding the animals and plants which the other programmes do not impart.
- ✓ **PSO-5** The study of cytogenetics provides them the knowledge of genes, cell and inheritance. Evolutionary biology provides the knowledge of evolution of animals including man in nature: Medical diagnostics, applied Zoology and Insect vector study provides the knowledge of diseases, economic importance of animals and causative organisms of diseases respectively.
- ✓ **PSO-6** Biosciences students become able to biochemistry, bioinformatics, Taxonomy, economy Zoology and ecology.