

## Academic year 2018-2019

### A. Program outcome and Program specific outcomes offered by the Department

Name of the Programme specialization : B.Sc. Botany

Program	Program outcomes	Program specific outcome
<p><b>Under graduate B.Sc Botany</b></p>	<p><u>1. Specific core discipline knowledge</u> Students can recall details and information about the evolution , anatomy, morphology, systematic, genetics, physiology, ecology and conservation of plants and all other forms of life.</p> <p>2. Students unique ecological and evolutionary features of the local and Indian flora.</p> <p><u>Communication skills</u> Students can communicate effectively using oral and written communication skills</p> <p><u>Problems solving and research skills</u> Students can generate and test hypotheses, make observations, collect data, analyze and interpret results, draw conclusions, and evaluate their significance within a broad scientific context.</p>	<ul style="list-style-type: none"> <li>• To recognize and identify major groups of non- vascular plants and their phylogenetic relationships.</li> <li>• To understand the phylogeny of plants and study various systems of classification.</li> <li>• To explore the morphological, anatomical, embryological details as well as economic importance of algae, fungi, bryophytes pteridophytes, gymnosperms and angiosperms.</li> <li>• To understand physiological processes and adaptations of plants</li> <li>• To provide knowledge about environmental factors and natural resources and their importance in sustainable development.</li> <li>• To be able to carry out phytochemical analysis of plant extracts and application of the isolated compounds for treatment of diseases.</li> <li>• To be able to deal with all microbes and the technologies for their effective uses in industry and mitigation of environmental concerns.</li> <li>• To explain how current medicinal practices are often based on indigenous plant knowledge and to get introduced to different perspectives on treating ailments according to ethnomedicinal principles.</li> <li>• To understand patterns of heredity and variation among individuals, species and populations and apply principles for improvement of quality and yield.</li> <li>• To be able to apply statistical tools to gain insights into significantly different data from different sources.</li> <li>• To acquire recently published knowledge in molecular biology , such as rDNA technology ; PTC and bioinformatics and their applications</li> </ul>

**B. Course Outcomes of all courses offered by the Department**

**Name of the Course : B.Sc Botany**

Sl.No	Course	Name of the course	Course code	Course objectives
1.	FYBSc (Semester I & Semester II)	Paper-I Plant Diversity-I	USBO101	Learner will get the knowledge of: <ul style="list-style-type: none"> <li>➤ Importance &amp; diversity of algae.</li> <li>➤ Mode of nutrition &amp; economic importance of fungi.</li> <li>➤ Life cycle of primitive bryophytes &amp; general characters of class Musci.</li> </ul>
		Paper-II Form & Function-I	USBO102	Learner will get the knowledge of: <ul style="list-style-type: none"> <li>➤ cell as basic unit of life with emphasis on plant cell.</li> <li>➤ Structure and function of Ecology and examples of different types of ecosystem.</li> <li>➤ Principles of Epistasis as non Mendelian genetics and ability to solve problem simple problems based on Epistasis.</li> </ul>
			USBO201	Learner will get the knowledge of: <ul style="list-style-type: none"> <li>➤ Stellar evolution &amp; life cycle of Nephrolepis.</li> <li>➤ Systematic botany through morphological characters, types of inflorescence.</li> <li>➤ Detail systematic position and life cycle of <i>Cycas</i> and its economic importance.</li> </ul>
			USBO202	Learner will get the knowledge of: <ul style="list-style-type: none"> <li>➤ Basics of anatomy, Epidermal, mechanical &amp; vascular tissue system, &amp; structure of root , stem &amp; leaves.</li> <li>➤ Various pigments involved in photosynthesis, light dependent and light independent pathway of photosynthesis . C3, C4 and CAM pathway for carbon assimilation.</li> <li>➤ Concept of Primary and secondary metabolites, active constituents found in common medicinal plants included in Grandma's Pouch.</li> </ul>
2.	SYBSc Semester III	Paper-I Plant Diversity	USBO301	The learner will get the knowledge of <ul style="list-style-type: none"> <li>➤ Cryptogams - their general characters, structure, life cycle &amp; economic importance.</li> <li>➤ Floral morphology, general characteristics and importance of angiosperms.</li> <li>➤ Techniques used to study Plant</li> </ul>

				Diversity.
	SYBSc Semester III	Paper-II Form and Function -II	USBO302	The learner will get the knowledge of ➤ Structure and functions of various cell organelles and different aspects of cell cycle and cell division. ➤ Mechanisms of sex determination ➤ Study the modes of DNA replication and protein synthesis.
		Paper III Current Trends in Plant Sciences-I	USBO303	The learner will get the knowledge of ➤ Pharmacognosy and various secondary metabolites found in plants. ➤ Different types of forests in India and their economic importance. ➤ Applications of Aromatherapy & nutraceuticals.
	SYBSc Semester IV	Paper-I Plant Diversity	USBO401	The learner will get the knowledge of ➤ Different Fungi - their general characters, structure, life cycle & pathogenicity. ➤ Basic features of Pteridophyta and Paleobotany. ➤ Gymnosperms-their distribution, life cycle & economic importance
		Paper-II Form and Function-II	USBO402	The learner will get the knowledge of ➤ Mechanical tissues and secondary growth in plants. ➤ Various processes involved in respiration, Photorespiration & Photoperiodism ➤ Biogeochemical cycles and various ecological factors.
		Paper III Current Trends in Plant Sciences-II	USBO403	The learner will get the knowledge of ➤ Indoor gardening and various national parks and botanical gardens. ➤ Plant tissue culture and r-DNA technology. ➤ Biostatistics and Bioinformatics
3.	TYBSc Semester V	Paper-II Plant Diversity-IV	USBO502	The learner will acquire knowledge of ➤ Fossils forms and understand their role in evolution ➤ Plant description , morphological and reproductive structures of seven families and also identify and classify according to Bentham & Hooker's System ➤ Pollen study and learn to apply it in various fields.
		Paper-III Form & Function- III	USBO503	The learner will acquire knowledge of ➤ Two important organelles and molecular mechanisms of translation. ➤ Principles and techniques of plant tissue culture and apply these studies for improving agricultures and horticulture

				and to become an entrepreneur.
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	TYBSc Semester V	Paper-II Plant Diversity-IV	USBO602	<p>The learner will acquire knowledge of</p> <ul style="list-style-type: none"> <li>➤ Contribution of Botanical gardens, BSI to angiosperm study and provide plant description , describe the morphological and reproductive structures of seven families</li> <li>➤ Phylogenetic system of classification .</li> <li>➤ Anatomical adaptations of different ecological plant groups .</li> <li>➤ Development of f male and female gametophytes, embryonic structure and development.</li> <li>➤ Different aspects and importance of Biodiversity and utilize them for conservation of species so as to prevent further loss or extinction of Biodiversity and preserve the existing for future generations</li> </ul>
		Paper-III Form & Function-III	USBO603	<p>The learner will acquire knowledge of</p> <ul style="list-style-type: none"> <li>➤ Various plant bimolecular structures and appreciate the structures, role, functions and applications of enzymes.</li> <li>➤ Nitrogen and plant hormone metabolism with applications of the same in agriculture and horticulture.</li> <li>➤ principles of genetic mapping, mutations and solve problems based on them, gain knowledge of various metabolic disorders and their implications</li> <li>➤ test hypotheses, make observations, collect data, analyze and interpret results, derive conclusions , and evaluate their significance within a broad scientific context, using suitable statistical techniques.</li> </ul>

Sl.No	Course	Name of the course	Course code	Course objectives
1.	TYBSc (Semester V)	Unit –I Environment and Pollution	USA CEVS501	<p>Learners shall comprehend the impact of the interrelationship between various components of environment.</p> <p>Learners will apply the knowledge of pollutants to undertake research projects studies.</p>

2.		Unit –II Green chemistry and sustainability		would be critical and creative during the designing, manufacturing and utilization of chemical products, which would reduce or eliminate the use or generation of hazardous substances.
3.		Unit –III Alternate Energy Resources		To comprehend, the importance of alternative energy resources. To emphasise the need, to conserve the energy resources. Learners shall value the alternative energy resources and hence follow the 4R's (Reduce, Reuse, Recycle & Reinvent)
		Unit –IV Applications of analytical Methods		Learners shall develop skills in instrumentation used for the study and analysis of various substances related to the environment.
		Unit –V Green / Environment Audit		Learners and facilitator both will develop conceptual clarity on pollution control and green environment auditing besides gaining knowledge about these programmes in the Indian scenario
		Unit –VI Industrial consultancy		Learners and facilitator both will be exposed to the various areas and facets of industrial consultancy, and shall also develop competency and confidence to explore it. Learner will be able to grasp the importance of various norms required for NPCB permits and procedure for liaison.
		Unit –VII Neo Avenues		Learners will develop an acumen to tap the potential for entrepreneurship with respect to environment related products and indoor plants.
		Unit –VIII Case studies and Simulations		Learners will comprehend and develop better acumen so as to take wise and necessary decisions while participating in environment related projects or framing policies/assessing environmental damages/ carrying out entrepreneurial activities beneficial to environment. Learners shall primarily learn to tackle real life situations with common sense.
	TYBSc (Semester VI)	Unit –I Business analytics of Environment Testing	USACEVS6 01	Learners will gain knowledge about environmental testing and monitoring laboratories, air, water quality and noise exposure standards and methods of physico-chemical and bacteriological sampling Learners will be exposed to the know how

				regarding establishing environmental testing and monitoring laboratories.
		Unit –II Ecological restoration		Learners will study and comprehend the treatment practices applied for domestic waste water and industrial effluents. Learners will be equipped with the knowledge of some alternatives to conventional resources.
		Unit –III Impact Assessment through Ecological Modelling		Learners will develop an understanding on the concept , application and limitation of modeling as a tool for summarizing or applying the research and survey findings. Learner will develop skills on the application of neural networking and statistical modeling.
		Unit –IV Finance		Learner will gain an insight into the basics of costing, book keeping and accountancy. Learners will be equipped to apply the concepts in his entrepreneurial ventures.
		Unit –V Biodiversity conservation & Ecotourism		Learners will develop aptitude to examine and assess the outcome of the framework of current biodiversity hotspots and biosphere reserves. Learners will be able to list the different aspects of wildlife photography and inspect the positive and negative aspects of it, also be able to recommend how wildlife photography can support biodiversity conservation. Learners will be able to assets the future challenges that ecotourism can generate for biodiversity conservation.
		Unit –VI Climate change		Learners will ponder upon and find out the what, why, where, whom and which of climate change and global warming Learners will be able to identify and evaluate the effects of the different sources of greenhouse substances.
		Unit –VII Environmental Education & Legislation		Learner will be imbibe positive changes in attitudes , commitments and civic actions required to combat harmful effects of anthropogenic activities and development on environment. Learner would inculcate ethical values and responsibilities towards protection of environment Learner will be equipped to implement goals of environment protection

**A. Program outcome and Program specific outcome offered by the Department**

**Name of the Programme specialization**

**: B.Sc. Chemistry**

Program	Program outcomes	Program specific outcomes
Under graduate B.Sc Chemistry	1. Learner will be able to gain knowledge about the concepts in Physical, Analytical, Organic and Inorganic Chemistry	1.A understanding of the fundamental concepts in Physical, Analytical, Organic and Inorganic Chemistry
	2.Learner will be able to develop skills on different methods of analysis	2.Apply the conceptual knowledge in experiments and develop skills in performing the experiments
	3.Learner will be able to recognize and appreciate the applications of chemistry in day to day life and understand its interdisciplinary avenues in various fields of Science and technology	3.Appllication to new developments in the field of chemistry and knowledge of the significance find application in industry, medicine and research.

**A. I. Course outcomes for all the courses offered by the department**

**Name of the course: B.Sc Chemistry**

Sl.No	Course	Name of the course	Course code	Course objectives
1.	FYBSc (Semester I & Semester II)	Paper-I (General Chemistry ) Paper-II (General Chemistry )	USCH101, USCH102, USCH201, USCH202, USCHP1 USCHP2	1.To make the students have a firm foundation in the fundamentals of chemical and scientific theories in Physical,Inorganic and Organic chemistry 2.To make learner understand the basic concepts of system ,surrounding, thermodynamic properties, functions, law of thermodynamics and introduction of thermochemistry 3.To allow the learner to deal with quantitative aspects of chemistry 4. To introduce the concepts of periodic table, periodicity of elements and their properties, effective nuclear charge, Slaters rule to the learner. 5. To familiarize the learner with the system of IUPAC nomenclature for organic compounds 6. To introduce the concept of hybridizationw.r.t to carbon, nitrogen and oxygen in organic compounds 7. To apply safety rules in the practice of laboratory investigations
2.	SYBSc (Semester III& Semester IV)	Paper-I (General Chemistry ) Paper-II (General Chemistry )	USCH301, USCH302, USCH303 USCH401, USCH402, USCH403, USCHP1	1. To infuse in the learner a spirit of inquiry into the fundamental aspects of the various core areas of Chemistry. 2. To make the learner proficient in analysing the various observations and chemical phenomena presented to him during the course. 3. To make the learner capable of solving

		) Paper III (Basics of Analytical Chemistry )	to USCHP6	<p>problems in the various units of this course</p> <p>4. To give the learner an opportunity to get hands on experience of the various concepts and processes in the various branches of chemistry</p> <p>5. To impart various skills of handling chemicals, reagents, apparatus, instruments and the care and safety aspects involved in such handling</p> <p>6. To make the learner capable of analysing and interpreting results of the experiments he conducts or performs</p>
3.	TYBSc (Semester V&SemesterV I) 6 Units	Paper-I (Physical Chemistry )	USCH501 USCH601 USCHP01 USCHP02	<ol style="list-style-type: none"> <li>1. To introduce to the learner molecular spectroscopy</li> <li>2. To take learners through colligative properties in chemical thermodynamics</li> <li>3. To orient learners about collision theory of chemical kinetics and classification of reactions</li> <li>4. To make learners aware of Nuclear chemistry</li> <li>5. To acquaint learners to surface chemistry</li> <li>6. To provide all learners a complete insight about colloidal state and surfactants</li> <li>7. To facilitate the learning of electrochemistry</li> <li>8. To impart knowledge of polymers</li> <li>9. To enlighten learners about the basics of quantum chemistry</li> <li>10. To make learners understand the importance of renewable energy resources</li> <li>11. To impart knowledge about nuclear magnetic spectroscopy</li> <li>12. To educate learners about electron spin resonance spectroscopy</li> <li>13. To introduce the learner to be competent at all basic laboratory skills and will be able to complement and develop these with more advanced techniques</li> </ol>
		Paper-II (Inorganic Chemistry )	USCH502 USCH602 USCHP03 USCHP04	<ol style="list-style-type: none"> <li>1. To introduce the concepts of molecular symmetry and chemical bonding</li> <li>2. To expose the learner to the concept of solid state chemistry and super conductivity</li> <li>3. To equip learner with a sound knowledge chemistry of inner transition elements, chemistry of nonaqueous solvents and chemistry of Group 16 and 17</li> <li>4. To enable the learner to understand the theories of metal-ligand bond, stability of metal complexes, reactivity of metal complexes and</li> </ol>

			<p>electronic spectra of complexes</p> <p>5. To develop an understanding of organometallic chemistry, metallocenes and catalysis</p> <p>6. To acquaint the learner with metallurgy, chemistry of group 18 and Bio inorganic molecules</p>
	Paper-III (Organic Chemistry)	USCH503 USCH603 USCHP05 USCHP06	<p>1. To make them aware of mechanism of organic reactions</p> <p>2. To introduce the concepts of photochemistry</p> <p>3. To expose the learner to stereochemistry</p> <p>4. To equip learner with heterocyclic chemistry</p> <p>5. To enable the learner to understand different methods of synthesis of organic compounds – Multicomponent synthesis and, green chemistry and synthesis.</p> <p>6. To acquaint the learner with IUPAC system of nomenclature of bicyclic, biphenyls, cummulene, quinolones and isoquinolines</p> <p>7. To introduce the learner to agrochemicals</p> <p>8. To give learner insight into planning of organic synthesis</p> <p>9. To equip learner with a sound knowledge of natural products</p> <p>10. To develop an understanding amino acids and proteins</p> <p>11. To introduce the principles of molecular rearrangements.</p> <p>12. To introduce basic concepts of structure, stereoisomers, mutarotation and reactions of carbohydrates</p> <p>13. To acquaint learners with the details of spectroscopy</p> <p>14. To introduce to the learner the basics nucleic acids and polymer</p> <p>15. To describe general features of catalyst and reagents in organic chemistry</p>
	Paper-IV (Analytical Chemistry)	USCH504 USCH604 USCHP07 USCHP08	<p>1. To introduce the concept of quality in analytical chemistry</p> <p>2. To make the learner understand the calculations for interconversion in chemical calculations and sampling</p> <p>3. To discuss the classical methods of analysis in</p>

				<p>relation to titrimetry –redox and complexometric titration</p> <ol style="list-style-type: none"> <li>4. To acquaint the learners on various optical methods specific reference to Atomic spectroscopy, Molecular spectroscopy, Phosphorescence spectroscopy, Turbidimetry and nephelometry</li> <li>5. To provide learners a complete insight to method of separation -solvent extraction, HPLC, HPTLC</li> <li>6. To facilitate the learning of electroanalytical techniques specific to Polarography and amperometric titrations</li> <li>7. To impart knowledge of Gas and Ion exchange chromatography</li> <li>8. To impart knowledge about TGA, DTA and thermometric titrations</li> <li>9. To make learners understand the importance Analytical method of validation</li> <li>10. To enlighten learners about food and cosmetic analysis</li> </ol>
		Applied component (Drugs & Dyes)	USACD501 USACD601 USACDD5P1 USACDD6P1	<ol style="list-style-type: none"> <li>1. To introduce to the learner the nomenclature, definition and basic idea of drugs</li> <li>2. To educate learners about routes of drug administration and dosage forms</li> <li>3. To take learners through the different types of drugs –analgesics, antipyretics and anti-inflammatory, cardiovascular, antidiabetic, anti-parkinsons and drugs for respiratory system.</li> <li>4. To orient learners about dyes –definition of terms in dyeing, nomenclature, naming of dyes by colour index</li> <li>5. To teach learners about natural and synthetic dyes.</li> <li>6. To make learners aware of types of fibres</li> <li>7. To acquaint learner to classification of dyes based on applications and dyeing methods</li> <li>8. To provide all learners a complete insight about optical brighteners</li> <li>9. To facilitate the learning of colour and constitution of dyes</li> <li>10. To impart knowledge of unit process and dye intermediates</li> <li>11. To enlighten learners about drug discovery, design and development</li> <li>12. To make learners understand the importance of nano particles in medicinal chemistry</li> <li>13. To impart knowledge about drugs and environmental aspects</li> </ol>

				<p>14. To educate learners about classification of dyes based on chemical constitution and synthesis of selected dyes</p> <p>15. To introduce basic terms of health and environmental hazards of synthetic dyes and their remediation process</p> <p>16. To develop conceptual clarity non textile uses of dyes</p> <p>17. To familiarize the learners with dyes used in food and cosmetics</p> <p>18. To introduce the learner to dye industry – Indian perspective</p>
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**A. Program outcome and Program specific outcome offered by the Department**

**Name of the Programme specialization**

**: B.Sc. Mathematics**

<b>Program</b>	<b>Program outcomes</b>	<b>Program specific outcomes</b>
Under graduate B.Sc Maths	<p>Mathematics has been fundamental to the development of science and technology. In recent decades, the extent of application of Mathematics to real world problems has increased by leaps and bounds. It is imperative that the content of undergraduate syllabi of Mathematics should support other branches of science such as Physics, Statistics and Computer Science. Enough exposure to Applications of Mathematics needs to be included in the curriculum.</p> <p><b>The courses are designed to develop mathematical reasoning and algorithmic thinking and have applications in Science and Technology.</b></p>	<p>This course is focused on concepts Algebra, Analysis, Calculus and Topology.</p> <p>The Applied Component course focuses Algorithms and Concepts of programming</p> <p>The present syllabi has been designed so that the students learn Mathematics needed for these branches, learn basic concepts of Mathematics and are exposed to rigorous methods gently and slowly.</p>

**B. I. Course outcomes for all the programmes offered by the department**

**Name of the course: B.Sc Mathematics**

<b>Sl.No</b>	<b>Course</b>	<b>Name of the course</b>	<b>Course code</b>	<b>Course objectives</b>
1.	<b>FYBSc (Semester I &amp; Semester II)</b>	<p>Paper-I Calculus – I and II</p> <p>Paper-II Algebra- I and II</p>	<p>USMT101, USMT102, USMT201, USMT202, USMTP01 USMTP02</p>	<ul style="list-style-type: none"> <li>▪ To teach Basic Calculus needed in every conceivable branch of science.</li> <li>▪ To teach Basic Algebra that lays foundations to Linear</li> </ul>

				Algebra, Number Theory and Discrete Mathematics’.
2.	<b>SYBSc (Semester III &amp; Semester IV)</b>	Paper-I Calculus –III and IV Paper-II Algebra III and IV Paper III Discrete Mathematics and Differential Equations	USMT301, USMT302, USMT303 USMT401, USMT402, USMT403, USMTP03 USMTP04	<ul style="list-style-type: none"> <li>▪ To introduce Differential and Integral Calculus of one and multi-variable in nature</li> <li>▪ To develop skills for tackling Mathematical Problems of finding area under a curve, surface area of revolution, solving System of Equations,</li> <li>▪ Use matrix as a tool to solve Linear Algebra Problems</li>   <li>▪ To introduce abstract structure of Group and study its properties</li> <li>▪ To learn all the concepts relating to linearity of ODE’s and computational solution methods for ODE’s and the real world applications of ODE’s</li> </ul>
3.	<b>TYBSc (Semester V &amp; Semester VI) 6 Units</b>	<b>Sem-V</b>  Paper-I Integral Calculus Paper II Linear Algebra Paper III Topology of Metric Spaces Paper IV Number Theory and Applications –I  <b>Sem-VI</b> Paper-I Complex Analysis	USMT501 USMT502 USMT503 USMT5B4  USMT601 USMT602 USMT603 USMT6B4	<ul style="list-style-type: none"> <li>▪ Study of Metric spaces , Notion of sequences continuity, Compactness Connectedness and Completeness and Applications</li> <li>▪ Introductions to Abstract structures like Rings Fields, Integral Domains and its applications to solve Polynomial Equations.</li> </ul>

		Paper II Algebra Paper III Metric Topology Paper IV Number Theory and Applications –II		<ul style="list-style-type: none"> <li>▪ To expose applications to Cryptography via Number Theory, Solutions to r Diaphantine Equations</li> <li>▪ Basics of Complex Analysis like Complex integration, Cauchy Integral Formula, Singularities, poles Residues and Complex Power series and its Applications</li> </ul> <p>To develop skills for tackling Mathematical Problems which are abstract in nature.</p>
		Applied Component in Sem V and VI:	USACCA501 USACCA601 USACCA5P1 USACCA6P1	<p>At the end of Semester VI a student will be proficient in</p> <ul style="list-style-type: none"> <li>▪ Building backend Web programs using Python.</li> <li>▪ Writing applets in Java</li> <li>▪ Data analysis and handling Databases using Oracle</li> <li>▪ Python programming for scientific computing using Computer Assisted Systems like- SAGEMATH</li> </ul>

**A. Program outcome and Program specific outcome offered by the Department**

**Name of the Programme specialization**

**: B.Sc. Physics**

<b>Program</b>	<b>Program outcomes</b>	<b>Program specific outcomes</b>
Under graduate B.Sc Physics	3. To develop analytical abilities towards real worldproblems	1. Athorough quantitative and conceptual understanding of the core areas of physics, including mechanics, , thermodynamics, quantum mechanics, electronics at a level compatible with graduate programs in physics atpeer institutions

	2. To familiarize with current and recent scientific and technological developments	2.The ability to analyze and interpret quantitative results, both in the core areas of physics and interdisciplinary areas.
	3. To enrich knowledge through problem solving, hands on activities, study visits, projects etc.	3.The ability to use contemporary experimental apparatus and analysis tools to acquire, analyze and interpret scientific data.

### B.I. Course outcomes for all the courses offered by the department

#### Name of the course: B.Sc Physics

Sl.No	Course	Name of the course	Course code	Course objectives
1.	FYBSc (Semester I & Semester II)	<b>Semester I</b> Paper-I <b>(Classical Physics)</b> Paper-II ( <b>Modern Physics</b> ) <b>Semester II</b> Paper-I <b>(Mathematical Physics)</b> Paper-II ( <b>Electricity and Electronics</b> )	USPH101, USPH102, USPH201, USPH202, USPHP1 USPHP2	<ul style="list-style-type: none"> <li>• Understand Newton's laws and apply them in calculations of the motion of simple systems.</li> <li>• Use the free body diagrams to analyze the forces on the object.</li> <li>• Understand the concepts of friction and the concepts of elasticity, fluid mechanics and be able to perform calculations using them.</li> <li>• Understand the concepts of lens system and interference.</li> <li>• Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process.</li> <li>• Demonstrate quantitative problem solving skills in all the topics covered</li> <li>• Understand the type isotopes and their applications.</li> <li>• Demonstrate and understand the quantum mechanical concepts.</li> <li>• Demonstrate quantitative skills in all the topics covered.</li> <li>• Understand the basic mathematical concepts and applications of them in physical situations.</li> <li>• Understand the diffraction and polarization processes and applications of them in</li> </ul>

				<p>physical situations.</p> <ul style="list-style-type: none"> <li>• Understand the applications of interference in design and working of interferometers.</li> <li>• Understand the resolving power of different optical instruments.</li> <li>• Understand the working of digital circuits</li> <li>• Use IC 555 timer for various timing applications.</li> <li>• Understand the postulates of quantum mechanics and to understand its importance in explaining significant phenomena in Physics.</li> </ul> <p><b>Practicals:</b></p> <ul style="list-style-type: none"> <li>• Understand and practice the skills while doing physics practical.</li> <li>• To understand the use of apparatus and their use without fear.</li> <li>• To correlate their physics theory concepts through practical.</li> <li>• Understand the concepts of errors and their estimation.</li> </ul>
2.	SYBSc (Semester III & Semester IV)	<p><b>Semester III</b> Paper-I (Mechanics and thermodynamics) Paper-II (Vector calculus, Analog Electronics) Paper III (Applied Physics I)</p> <p><b>Semester IV</b> Paper-I (Optics and Digital Electronics) Paper-II (Quantum Physics) Paper III (Applied Physics II)</p>	USPH301, USPH302, USPH303, USPH401, USPH402, USPH403, USPHP1 to USCHP6	<ul style="list-style-type: none"> <li>• Understand the concepts of mechanics &amp; properties of matter &amp; to apply them to problems.</li> <li>• Comprehend the basic concepts of thermodynamics &amp; its applications in physical situation.</li> <li>• Learn about situations in low temperature.</li> <li>• Demonstrate tentative problem solving skills in all above areas.</li> <li>• Understand the basic physics and their concepts of mathematical applications in physical situations.</li> <li>• Understand the basic laws of electrodynamics and be able to perform</li> </ul>

				<p>calculations using them.</p> <ul style="list-style-type: none"> <li>• Understand the basics of transistor biasing, operational amplifiers, their applications</li> <li>• Understand the basic concepts of oscillators and be able to perform calculations using them.</li> <li>• Students will appreciate the role of Physics in 'interdisciplinary areas related to materials, Bio Physics, Acoustics etc.</li> <li>• Understand the scope of the subject in Industry &amp; Research.</li> </ul>
3.	TYBSc (Semester V & Semester VI) 6 Units	<p><b>Semester V</b> Paper-I (Mathematical, Thermal and Statistical Physics)</p> <p><b>Semester VI</b> Paper-I (Classical Mechanics)</p>	<p>USPH501 USPH601 USPHP01 USPHP02</p>	<ul style="list-style-type: none"> <li>• Learn some mathematical techniques required to understand the physical phenomena at the undergraduate level and get exposure to important ideas of statistical mechanics.</li> <li>• Skill to solve simple problems in probability, understand the concept of independent events and work with standard continuous distributions.</li> <li>• Understand the concept of microstates, Boltzmann distribution and statistical origins of entropy</li> <li>• Understand the kinds of motions that can occur under a central potential and their applications to planetary orbits.</li> <li>• Learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle.</li> <li>• Understand simple concepts from fluid mechanics and understanding of the dynamics of rigid bodies</li> <li>• Understand the effect of adding nonlinear corrections to usual problems of mechanics and nonlinear mechanics</li> </ul>
		<p><b>Semester V</b> Paper-II (Solid State Physics) Semester VI Paper-II <b>(Electronics)</b></p>	<p>USCH502 USCH602 USCHP03 USCHP04</p>	<ul style="list-style-type: none"> <li>• Understand the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity.</li> <li>• Understand the basic concepts of Fermi</li> </ul>

				<p>probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity.</p> <ul style="list-style-type: none"> <li>• Develop quantitative problem solving skills in all the topics covered.</li> <li>• Understand the basics of semiconductor devices and their applications.</li> <li>• Understand the basic concepts of operational amplifier: its prototype and applications as instrumentation amplifier, active filters, comparators and waveform generation.</li> <li>• Understand the basic concepts of timing pulse generation and regulated power supplies</li> <li>• Understand the basic electronic circuits for universal logic building blocks and basic concepts of digital communication.</li> <li>• Develop quantitative problem solving skills in all the topics covered.</li> </ul>
		<p><b>Semester V</b> Paper-III (Physics Atomic and Molecular) <b>Semester VI</b> (Nuclear Physics)</p>	<p>USCH503 USCH603 USCHP05 USCHP06</p>	<ul style="list-style-type: none"> <li>• Understand the application of quantum mechanics in atomic physics</li> <li>• Understand the importance of electron spin, symmetric and antisymmetric wave functions and vector atom model</li> <li>• Understand effect of magnetic field on atoms and its application</li> <li>• Learn Molecular physics and its applications.</li> <li>• This course will be useful to get an insight into spectroscopy</li> <li>• Understand the fundamental principles and concepts governing classical nuclear and particle physics and have a knowledge of their applications interactions of ionizing radiation with matter the key techniques for particle accelerators the physical processes involved in nuclear power generation.</li> <li>• Acquire knowledge on elementary particles will help students to understand the fundamental constituents of matter and lay foundation for the understanding of unsolved questions about dark matter, antimatter and other research</li> </ul>

			oriented topics.
	<b>Semester V</b> Paper-IV <b>(Electrodynamics)</b> <b>Semester VI</b> Paper-IV (Special Theory of Relativity)	USCH504 USCH604 USCHP07 USCHP08	<ul style="list-style-type: none"> <li>• Understand the laws of electrodynamics and be able to perform calculations using them.</li> <li>• Understand Maxwell's electrodynamics and its relation to relativity</li> <li>• Understand how optical laws can be derived from electromagnetic principles.</li> <li>• Develop quantitative problem solving skills.</li> <li>• Understand the significance of Michelson Morley experiment and failure of the existing theories to explain the null result</li> <li>• Understand the importance of postulates of special relativity, Lorentz transformation equations and how it changed the way we look at space and time, Absolutism and relativity, Common sense versus Einstein concept of Space and time.</li> <li>• Understand the transformation equations for: Space and time, velocity, frequency, mass, momentum, force, Energy, Charge and current density, electric and magnetic fields.</li> <li>• Solve problems based on length contraction, time dilation, velocity addition, Doppler effect, mass energy relation and resolve paradoxes in relativity like twin paradox etc.</li> </ul>

**A. Program outcome and Program specific outcome offered by the Department**

**Name of the Programme specialization : B.Sc.Zoology**

Program	Program outcomes	Program specific outcomes
Under graduate B.Sc Chemistry	<ul style="list-style-type: none"> <li>➤ To nurture interest in the students for the subject of Zoology</li> <li>➤ To create awareness of the basic and modern concepts of Zoology</li> <li>➤ To empower the students with knowledge to take up entrepreneurship in the field of Economic Zoology</li> </ul>	<ul style="list-style-type: none"> <li>➤ To inculcate good laboratory practices in students and to train them about scientific handling of important instruments.</li> <li>➤ To orient students and provide an insight into various advanced areas in the field of Zoology</li> </ul>

**B. Course outcomes for all the courses offered by the department**

**Name of the Programme: B.Sc Zoology**

Sl.No	Course	Name of the course	Course code	Course objectives
1	FYBSc - Semester I	Paper-I Wonders of Animal World, Biodiversity and its Conservation	USZO101	<ul style="list-style-type: none"> <li>➤ To take learners through a captivating journey of hoarded wealth of marvelous animal world.</li> <li>➤ To orient learners about rich heritage of Biodiversity of India and make them understand significance of its conservation.</li> <li>➤ To teach learners about innovative and novel work of scientists/philosopher/entrepreneurs in the field of biological sciences.</li> </ul>
2	FYBSc- Semester I	Paper-II Instrumentation and animal biotechnology	USZO102	<ul style="list-style-type: none"> <li>➤ To make learners aware of risks involved in handling of different hazardous chemicals, sensitive (electrical/electronic) instruments and infectious biological specimens especially during practical sessions in the laboratory and to train them to avoid mishap.</li> <li>➤ To acquaint learners to the modern developments and concepts of Zoology highlighting their</li> </ul>

				<p>applications aiming for the benefit of humankind.</p> <ul style="list-style-type: none"> <li>➤ To provide all learners a complete insight about the structure and train them with operational skills of different instruments required in Zoology</li> </ul>
3	<b>FYBSc-Semester II</b>	Paper I- Ecology and Wildlife Management	USZO201	<ul style="list-style-type: none"> <li>➤ To facilitate the learning of population ecology, its dynamics and regulatory factors important for its sustenance</li> <li>➤ To impart knowledge of different components of ecosystem and educate about essentials of coexistence of human beings with all other living organisms.</li> <li>➤ To enlighten learners about the current status of wild life conservation in India in the light of guidelines from different relevant governing agencies vis-à-vis with adversity of poaching and biopiracy.</li> </ul>
4	<b>FYBSc-Semester II</b>	Paper II- Nutrition, Public health and Hygiene	USZO202	<ul style="list-style-type: none"> <li>➤ To make learners understand the importance of balanced diet and essential nutrients of food at different stages of life.</li> <li>➤ To impart knowledge about source, quantity and need for conservation of fast depleting water resource and essential of maintaining proper sanitation, hygiene and optimization of use of electronic gadgets.</li> <li>➤ To educate learners about causes, symptoms and impact of stress related disorders and infectious diseases</li> </ul>
5	<b>SYBSc-Semester III</b>	Paper I Fundamentals of Genetics, Chromosomes and Heredity, Nucleic acids	USZO301	<ul style="list-style-type: none"> <li>➤ To introduce basic terms of genetics.</li> <li>➤ To develop conceptual clarity of Mendelian principles of inheritance and other forms and pattern of inheritance</li> <li>➤ To familiarize the learners with the structure, types and classification of chromosomes.</li> <li>➤ To introduce the concept of sex determination and its types, sex influenced and sex-limited genes.</li> <li>➤ To introduce the learner to the classical experiments proving DNA as the genetic material.</li> </ul>

				<ul style="list-style-type: none"> <li>➤ To introduce the learner the structure of nucleic acids and the concept of central dogma of molecular biology.</li> <li>➤ To familiarize the learner with the concept of gene expression and regulation.</li> </ul>
6	<b>SYBSc - Semester III</b>	Paper II Nutrition and Excretion, Respiration and Circulation, Control and Coordination of Life Processes, Locomotion and Reproduction	USZO302	<ul style="list-style-type: none"> <li>➤ To introduce the concepts of physiology of nutrition, excretion and osmoregulation.</li> <li>➤ To expose the learner to various nutritional apparatus, excretory and osmoregulatory structures in different classes of organisms.</li> <li>➤ To introduce the concepts of physiology of respiration and circulation</li> <li>➤ To expose the learner to various respiratory and circulatory organs in different classes of organisms</li> <li>➤ To introduce the concepts of physiology of control and coordination, locomotion and reproduction</li> <li>➤ To expose the learner to various locomotory and reproductive structures in different classes of organisms.</li> </ul>
7	<b>SYBSc - Semester III</b>	Elective: Ethology, Parasitology, Economic Zoology	USZOE1303	<ul style="list-style-type: none"> <li>➤ To equip learner with a sound knowledge of how animals interact with one another and their environment.</li> <li>➤ To enable the learner to understand different behavioural patterns.</li> <li>➤ To acquaint the learner with the concepts of parasitism and its relationship in the environment.</li> <li>➤ To introduce the learner to modes of transmission of parasites</li> <li>➤ To disseminate information on economic aspects of animals like apiculture, vermiculture and dairyscience.</li> <li>➤ To encourage young learner for self-employment</li> </ul>
8	<b>SYBSc - Semester IV</b>	Paper –I Origin and Evolution of Life, Population Genetics and Evolution, Scientific	USZO401	<ul style="list-style-type: none"> <li>➤ To impart scientific knowledge about how life originated on our planet</li> <li>➤ To develop an understanding of genetic variability within a population and learn as to how the change in the gene pool leads to evolution of species</li> <li>➤ To inculcate scientific temperament in</li> </ul>

		Attitude, Methodology, Scientific Writing and Ethi cs in Scientific Re search		the learner
9	<b>SYBSc - Semester IV</b>	Paper –II Cell Biology, Endom embrane System , Biomolecules	USZO402	<ul style="list-style-type: none"> <li>➤ To study the structural and functional organization of cell with an emphasis on nucleus, plasma membrane and cytoskeleton.</li> <li>➤ To acquaint the learner with ultrastructure of cell organelles and their functions</li> <li>➤ To give learner insight into the structure of biomolecules and their role in sustenance of life.</li> </ul>
10	<b>SYBSc - Semester IV</b>	Elective: Comparative Em bryology, Aspec ts of Human Repr oduction, Polluti on and its effect o n organisms	USZOE140 3	<ul style="list-style-type: none"> <li>➤ To acquaint the learner with key concepts of embryology</li> <li>➤ To acquaint the learners with different aspects of human reproduction.</li> <li>➤ To make them aware of the causes of infertility, techniques to overcome infertility and the concept of birth control</li> <li>➤ To provide a panoramic view of impact of human activities leading to pollution and its implications</li> </ul>
11	<b>TYBSc - Semester V</b>	Paper –I Taxonomy - Invertebrates and Type Study	USZO501	<ul style="list-style-type: none"> <li>➤ To introduce the principles of taxonomy and modern system of classification in animal kingdom with the evolution point of view.</li> <li>➤ To comprehend the general characters and classification of Kingdom Animalia from Poriferata to Nematoda and specific characters of organisms belonging to these phyla.</li> <li>➤ To introduce basic concepts of classification up to class in animal kingdom from phylum Annelidata to Hemichordata and to familiarize with their characters.</li> <li>➤ To acquaint learners with the details of Sepia as a representative of invertebrate animals.</li> </ul>
12	<b>TYBSc - Semester V</b>	Paper –I Haematology and Immunology	USZO502	<ul style="list-style-type: none"> <li>➤ To introduce to the learner the composition of blood, haemorrhage and haematopoiesis.</li> <li>➤ To acquaint the learner with the physiology of blood clotting and clinical aspects of</li> </ul>

				<p>haematology</p> <ul style="list-style-type: none"> <li>➤ To introduce to the learner the basics of applied haematology and to impart knowledge of diagnostic techniques used in pathology.</li> <li>➤ To introduce the topic of immunology by emphasizing the basic concepts to build a strong foundation and to give an overview of the immune system that plays an important role in disease resistance.</li> <li>➤ To introduce immunopathology to the learner</li> <li>➤ To introduce the concept of vaccines and vaccination.</li> <li>➤ To familiarise the learner to immunological perspectives of organ transplantation.</li> </ul>
13	<b>TYBSc- Semester VI</b>	Paper –I Taxonomy - Chordates and Type Study	USZO601	<ul style="list-style-type: none"> <li>➤ To introduce basic concepts of modern Chordate classification with evolution point of view and to understand the concept of taxonomy in higher animal kingdom.</li> <li>➤ To describe general features and classify the vertebrates – fishes and amphibians</li> <li>➤ To introduce the learner to the distinguishing characters of classes Reptilia, Aves and Mammalia and their adaptive features with reference to their habitat.</li> <li>➤ To study in depth one vertebrate animal type i.e. general characteristics and salient features of animal type-shark</li> </ul>
14	<b>TYBSc- Semester VI</b>	Paper –II Physiology and Tissue Culture	USZO602	<ul style="list-style-type: none"> <li>➤ To introduce to the learner the fundamental concepts of enzyme biochemistry and to enable the learner realize applications of enzymes in basic and applied sciences.</li> <li>➤ To introduce to the learner the concept of homeostasis- thermoregulation and osmoregulation</li> <li>➤ To introduce to the learner the details of endocrine glands and its disorders.</li> <li>➤ To introduce to the learner the fundamental concepts of tissue culture and guide them progressively to certain areas of animal tissue culture</li> </ul>