

SWARNIM STARTUP & INNOVATION UNIVERSITY

SCHOOL OF SCIENCE

Program	B.Sc (Bachelor of Science)					
Course	B.Sc.-Chemistry B.Sc.-Mathematics B.Sc.-Physics B.Sc.-Microbiology B.Sc.-Biotechnology					
Duration	Semester-1	Semester-2	Semester-3	Semester-4	Semester-5	Semester-6
Compulsory Subjects	Chemistry-1	Chemistry-2	Chemistry-3	Chemistry-4	Chemistry-5	Chemistry-6
	Maths-1	Maths-2	Maths-3	Maths-4	Maths-5	Maths-6
	Physics-1	Physics-2	Physics-3	Physics-4	Physics-5	Physics-6
	Microbiology-1	Microbiology-2	Microbiology-3	Microbiology-4	Microbiology-5	Microbiology-6
	Biotechnology-1	Biotechnology-2	Biotechnology-3	Biotechnology-4	Biotechnology-5	Biotechnology-6
	Introduction to Entrepreneur	Introduction to Innovation & Ideation	Introduction to Innovation & Ideation-3	Introduction to Innovation & Ideation-4	Introduction to Innovation & Ideation-5	Introduction to Innovation & Ideation-6
Additional Subjects	English-1	English-2	English-3	English-4	English-5	English-6
	Fundamentals of Computer Application	Computer Application & Graphics	Computer Application & Graphics-3	Computer Application & Graphics-4	Computer Application & Graphics-5	Computer Application & Graphics-6

- B.Sc Study includes three Years (i.e. 6 semesters).
- Aim and objective of this study is to develop a solid grasp of core concepts and applications of Science. They learn how science and other disciplines have impacted and continue to impact each other and society.
- They develop laboratory skills throughout our curriculum via hands-on experiences with diverse experimental techniques and tools.
- They learn various approaches to data analysis and become comfortable using computational methods to analyze and solve problems.

Exam Assessment: Semester-1

Every semester there will be 1 internal exam and 1-university final exam.

B.Sc.- Chemistry:

Internal Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	30	12	50	18
Maths-1	30	12	50	18
Physics-1	30	12	50	18
Microbiology-1	30	12	50	18
Biotechnology-1	30	12	50	18
Introduction to Entrepreneur	30	12	20	08
English-1	30	12	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

University Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	70	23	NA	NA
Maths-1	70	23	NA	NA
Physics-1	70	23	NA	NA
Microbiology-1	70	23	NA	NA
Biotechnology-1	70	23	NA	NA
Introduction to Entrepreneur	70	23	30	12
English-1	70	23	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

B.Sc.- Mathematics:

Internal Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	30	12	50	18
Maths-1	30	12	50	18
Physics-1	30	12	50	18
Introduction to Entrepreneur	30	12	20	08
English-1	30	12	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

University Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	70	23	NA	NA
Maths-1	70	23	NA	NA
Physics-1	70	23	NA	NA
Introduction to Entrepreneur	70	23	30	12
English-1	70	23	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

B.Sc. -Physics:

Internal Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	30	12	50	18
Maths-1	30	12	50	18
Physics-1	30	12	50	18
Introduction to Entrepreneur	30	12	20	08
English-1	30	12	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

University Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Chemistry-1	70	23	NA	NA
Maths-1	70	23	NA	NA
Physics-1	70	23	NA	NA
Introduction to Entrepreneur	70	23	30	12
English-1	70	23	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

B.Sc. -Microbiology:

Internal Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Microbiology-1	30	12	50	18
Biotechnology-1	30	12	50	18
Chemistry-1	30	12	50	18
Introduction to Entrepreneur	30	12	20	08
English-1	30	12	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

University Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Microbiology-1	70	23	NA	NA
Biotechnology-1	70	23	NA	NA
Chemistry-1	70	23	NA	NA
Introduction to Entrepreneur	70	23	30	12
English-1	70	23	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

B.Sc. -Biotechnology:

Internal Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Biotechnology-1	30	12	50	18
Microbiology-1	30	12	50	18
Chemistry-1	30	12	50	18
Introduction to Entrepreneur	30	12	20	08
English-1	30	12	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

University Examination				
Subjects	Theory Marks	Passing Marks	Practical Marks	Passing Marks
Biotechnology-1	70	23	NA	NA
Microbiology-1	70	23	NA	NA
Chemistry-1	70	23	NA	NA
Introduction to Entrepreneur	70	23	30	12
English-1	70	23	NA	NA
Fundamentals of Computer Application	NA	NA	50	18

- For practical and Viva of ENT and Computer subjects 1 external is required for final university exam.
- For each and every exam conducted we require sufficient amount of answer supplementary and question paper printout by university.
- Journals are compulsory in all laboratories, in addition graph papers, lab coat ect are also required.

Syllabus of B.Sc: Semester-1

1. Chemistry-1:

Sr. No.	Course Contents
1	<p>1.1 CHEMICAL BONDING</p> <p>Valence bond theory.</p> <p>Application of valancebond theory.</p> <p>Directional characteristics of covalent bond (s-s, s-p and p-p).</p> <p>Various types of hybridization and shape of simple inorganic molecules</p> <p>V.S.E.P.R. theory for NH₃, H₂O, CH₄ .</p> <p>M.O. Theory-Energy level diagram for homo nucleus diatomic molecules (N₂ and O₂) and hetero diatomic molecule (CO and NO)</p> <p>1.2 F-BLOCK ELEMENTS</p> <p>History of Lanthanides.</p> <p>Minerals of lanthanides.</p> <p>Electronic configuration of lanthanides.</p> <p>Oxidation state of lanthanides.</p> <p>Color of lanthanides.</p> <p>Magnetic properties of lanthanides.</p> <p>Lanthanide contraction,</p> <p>Effect of lanthanide contraction</p> <p>Separation method</p> <p>(1)Solvent extraction methods</p> <p>(2)Ion Exchange Method</p>
2	<p>2.1 STRUCTURE AND PROPERTIES</p> <p>Factors affecting to the properties of organic molecule</p> <p>Intermolecular forces</p>

	<ul style="list-style-type: none"> • Dipol-dipol interaction • Vander waals forces <p>Intramolecular forces</p> <ul style="list-style-type: none"> • Electromeric effect • Inductive effect • Resonance effect (draw resonating structures of Nitro benzene, Chlorobenzene, Phenoxide ion, Anillinium ion, Acetate ion) • Hyperconjugation <p>2.2 REACTION MECHANISM</p> <p>Fission of Co-Valent bond (With atleast one reaction as a example of each intermediates)</p> <ol style="list-style-type: none"> 1. Types of reagents. 2. Types of organic reactions with mechanism. <ul style="list-style-type: none"> • Nucleophilic Substitution reactions • Electrophilic Substitution reactions • Nucleophilic addition reactions • Electrophilic addition reactions • Elimination reactions (E1 & E2)
3	<p>THERMODYNAMICS</p> <ul style="list-style-type: none"> • System and surrounding- work & heat, state function, thermodynamic process, • internal energy, enthalpy, free energy, maximum work function. • Zeroth law of thermodynamics • First law of thermodynamics • Concept of entropy ; entropy change for an ideal gas under different conditions, entropy change for mixture of ideal gases. • Heat capacity, specific and molar heat capacity, heat capacity at constant volume and pressure and their relationship • Free energy work functions : Helmholtz free energy (A), Gibbs free energy (G), relation between A & G, Helmholtz work function and free energy function for isothermal condition and its physical significance, free energy change with pressure and temperature.

	<ul style="list-style-type: none"> • Work done in adiabatic and isothermal reversible expansion of an ideal gas. • Carnot cycle and its efficiency • Gibbs-Helmholtz equation • Want-hoff isotherm and isochors • Numerical
4	<p>ANALYTICAL CHEMISTRY</p> <ul style="list-style-type: none"> • Introduction to Analytical Chemistry • Classification of Classical and Electro analytical Techniques. • Literature of Analytical Chemistry (Names of Author and Publishers for Any Ten Books, Journals and Reviews) • Criterion for Selection of analytical Techniques. • Analytical Data Treatment <p>Error, Types of errors, Accuracy and Precision.</p> <p>Statistical Terms :</p> <p>Mode, Average, Median, Deviation, Average Deviation, Relative Average Deviation, Standard Deviation & Coefficient of variance.</p> <p>Q-Test for the rejection of result and related numerical.</p> <p>Q-Test for the rejection of result and related numerical.</p>

2 . Mathematics-1

Sr. No.	Subject content
1	Unit 1 Successive Derivatives, standard results for n^{th} derivative, Leibniz's Theorem. Definition of limit of a sequence, Convergence and divergence of an infinite series, Alternating Series (Without proof). Comparison test, Ratio test and Root test.
2	Unit: 2 Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems (MVT), Increasing and decreasing functions, Taylor's and Maclaurin's Theorems (both without proof). Using Taylor's and Maclaurin's Theorem find Maclaurin power series expansion of $\sin x$, $\cos x$, $\log(1+x)$, e^x , $(1+x)^n$ under proper restrictions(if any). Indeterminate forms: all forms of L'Hôpital's Rules with proof and all forms
3	Unit: 3 Introduction to matrices, different types of matrices, operations on matrices, Theorems on matrices, Elementary operations on matrices and types of matrices, Symmetric and skew-symmetric matrices, Hermitian and skew-hermitian matrices. Linear dependence and independence of row and column matrices. Row rank, column rank and rank of a matrix. Row Reduced Echelon (RRE) form of a matrix and matrix inversion using it.
4	Unit: 4 Eigen values, Eigen vectors and the characteristic equation of a matrix. Cayley-Hamilton (CH) theorem and its use in finding inverse of a matrix. Application of matrices in solving a system of simultaneous linear equations. Cramer's rule. Theorems on consistency of a system of simultaneous linear equations.

3 . Physics-1

Sr. No.	Course Contents
1	<p>Electrostatic:</p> <p>Differential form of Gauss law, Poisson and Laplace Equation, Field between Two concentric spheres which have equal and opposite charges. A useful Theorem in electrostatics, electrostatic potential, Determination of potential Due to uniformly charged spherical shell. Determination of potential and field by a ring of charges at a point on the axis of the ring. Determination of field of a semicircular uniform distribution of line charge of linear charge density. Determination of a potential and field on the axis and rim of a uniformly charged disc. Electrostatic energy of a continuous distribution of charges, field of a dipole In plane polar coordinate, spherical polar coordinate, Cartesian coordinate System, electric dipole in a non uniform electric field, Mutual potential Energy of two dipoles.</p>
2	<p>Electric & Electronic Circuits:</p> <p>DC Circuits :</p> <p>RL circuits (Growth and decay of current), RC circuit (Charging and discharging of capacitor) L-C-R circuit in series with DC source.</p> <p>AC Bridges:</p> <p>Condition for bridge balance, Maxwell bridge, Hay bridge, Schering bridge, Wein bridge</p> <p>Diode circuits :</p> <p>Load line analysis of a diode circuit, use of diode in rectifier, Half wave, full wave and bridge rectifier with their performance, Capacitor input filter.</p>
3	<p>Plasma Physics:</p> <p>Introduction, Composition & characteristics of a plasma, Collisions,</p>

	Surface phenomena, Transport (or transfer) phenomena, Diffusion & Mobility : Ambipolar Diffusion, Viscosity : Conductivity, Recombination, Ohm's law, Gas Discharge, Comparison of various natural & man-made plasma, Plasma diagnostics, plasma waves & Instabilities confinement of plasma, space plasma
4	Nuclear Physics: Radioactivity: The law of radioactive decay (review), Radioactive growth and decay, ideal equilibrium, Transient equilibrium and secular equilibrium, Radio active series, Radioactive isotopes of lighter elements, Artificial radioactivity, Age of earth, Carbon dating (Archaeological time scale)

4 . Microbiology-1

Sr. No.	Course Contents
1	History of Development of Microbiology: Development of microbiology as a discipline, Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming. Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner
2	Diversity of Microbial World: Systems of classification: Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility. Difference between prokaryotic and eukaryotic microorganisms.

	<p>General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.</p>
3	<p>Algae</p> <p>History of phycology with emphasis on contributions of Indian scientists; General characteristics of algae including occurrence, thallus organization, algae cell ultra structure, pigments, flagella, eyespot food reserves and vegetative, asexual and sexual reproduction. Different types of life cycles in algae with suitable examples: Haplobiontic, Haplontic, Diplontic, Diplobiontic and Diplohaplontic life cycles.</p> <p>Applications of algae in agriculture, industry, environment and food.</p> <p>Fungi</p> <p>Historical developments in the field of Mycology including significant contributions of eminent mycologists. General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and Para sexual mechanism.</p> <p>Economic importance of fungi with examples in agriculture, environment, Industry, medicine, food, bio deterioration and mycotoxins.</p> <p>Protozoa</p> <p>General characteristics with special reference to <i>Amoeba</i>, <i>Paramecium</i>, <i>Plasmodium</i>, <i>Leishmania</i> and <i>Giardia</i></p>
4	<p>An overview of Scope of Microbiology</p>

5. Biotechnology-1

Sr. No.	Course Contents
1	Structure and organization of Cell: Cell Organization – Eukaryotic (Plant and animal cells) and prokaryotic, Plasma membrane: Structure and transport of small molecules, Cell Wall: Eukaryotic cell wall, Extra cellular matrix and cell matrix interactions, Cell-Cell Interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects) Mitochondria, chloroplasts and peroxisomes, Cytoskeleton: Structure and organization of actin filaments, association of actin filaments with plasma membrane, cell surface protrusions, intermediate filaments, microtubules
2	Nucleus: Nuclear envelope, nuclear pore complex and nuclear lamina, Chromatin – Molecular organization, Nucleolus.
3	Protein Sorting and Transport: Ribosomes, Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing and quality control in ER, smooth ER and lipid synthesis, export of proteins and lipids, Golgi Apparatus – Organization, protein glycosylation, protein sorting and export from Golgi Apparatus, Lysosomes.
4	Cell Signalling: Signalling molecules and their receptors, Function of cell surface receptors, Pathways of intra-cellular receptors – Cyclic AMP pathway, cyclic GMP and MAP kinase pathway
5	Cell Cycle, Cell Death and Cell Renewal: Eukaryotic cell cycle and its regulation, Mitosis and Meiosis, Development of cancer, causes and types, Programmed cell death, Stem cells, Embryonic stem cell, induced pluripotent stem cells

