Government College, Chhachhrauli (Yamuna Nagar)

COURSE : BACHELOR OF SCIENCE (B.Sc.) – Non Medical

Program Outcome
Bachelor of Science (B.Sc.) – Non Medical is a three-year degree programrecognized by Kurukshetra University, Kurukshetra and follows the syllabus prescribed by the university. Our students are allowed to choose one subject combination from (Computer Science, Mathematics&Physics) and (Chemistry, Mathematics&Physics) as per university norms. After completing the three-year degree program, students will be able to attain Life Skills, Critical Thinking Skills and Employability Skills in the field of sciences. The program also empowers the graduates to appear for various competitive examinations or choose the post graduate program of their choice.

Course Outcome: Mathematics
Year: 1st Semester: 1st
Course: BM-111 ALGEBRA
Upon successful completion of the course, students will be able to • Determine rank of a matrix, eigen values, eigen vectors, characteristic equation and characteristic polynomial of square matrices. • Understand Hermitian and skew-Hermitian matrices, unitary and orthogonal matrices and to solve related problems. • Find solution of homogeneous and non-homogeneous system of linear equations using matrices • Determine relation between roots and coefficients of a general polynomial equation in one variable • Solve cubic and biquadratic equations. Application of Descarte's rule of sign
Course: BM-112 CALCULUS
Upon successful completion of the course, students will be able to • Calculate the limit of functions, examine the continuity of functions, understand differentiability of different type of functions, successive differentiation of functions and series expansions • Understand the concepts of asymptotes, curvature, evolutes and involutes of a curve. • Determine singular points of a curve and their types. • To understand rectification of curves and to apply the reduction formulae. • Determine area bounded by curves and volumes and surface area of solids formed by revolution of curves
Course: BM-113 SOLID GEOMETRY
Upon successful completion of the course, students will be able to

- Understand the concept of a second degree equation representing different conic sections and its classification and properties
- Learn general form of equation of a sphere and to solve problems related to intersection of spheres, tangent plane and line, orthogonality
- Learn equations of cones and cylinders and to solve related problems
- Familiarize with concepts of conicoids and related tangent plane, director sphere, normal, paraboloids, reduction of second degree equations

Year: 1st Semester: 2nd

Course:BM-121 Number Theory and Trigonometry

Upon successful completion of the course, students will be able to

- Understand the concepts of divisibility, Fundamental Theorem of Arithemetic. Linear Congruences, Fermat's theorem. Wilson's theorem and its converse. Linear Diophanatine equations in two variables
- Understand the concepts of Euler function, Chinese Remainder Theorem, Quadratic residues, Greatest integer function [x],Number of divisors and the sum of divisors of a natural number n
- Understand the concepts of De Moivre's Theorem and its Applications, Inverse circular and hyperbolic functions and their properties

Course:BM-122 Ordinary Differential Equations

Upon successful completion of the course, students will be able to

- Understand the basic concepts of ordinary differential equations and to learn various techniques of finding exact solutions of certain solvable first order differential equations
- Develop the skills of solving homogeneous and non-homogeneous second order linear ordinary differential equations with constant coefficients and with variable coefficients

Course:BM-123 Vector Calculus

Upon successful completion of the course, students will be able to

- Understand and solve problems related to scalar and vector product of vectors. Learn vector differentiation and directional derivatives and their problem solving
- Learn gradient, divergence and curl operators. Apply knowledge and these tools in problem solving
- Understand vector identities, Laplacian operator. Learn vector integration and line integral. Solve problems using these concepts
- Learn surface and volume integral formulations and their evaluation. Prove Gauss Divergence, Green's and Stoke's theorems. Realize importance of Green, Gauss and Stokes' theorems

Year: 2nd Semester: 3rd

Course:BM-231 Advanced Calculus

Upon successful completion of the course, students will be able to

- Understand and to prove Rolle's Theorem, mean value theorems and their geometrical interpretations. To determine indeterminate forms.
- Learn conceptual variations while advancing from one variable to several variables in calculus, limit and continuity, partial differentiation of such functions. To understand composite functions, homogeneous functions and to solve related problems.
- Understand differentiability of real valued functions of two variables and to prove associated results. To determine maximum and minimum of functions of two variables and to apply multivariable calculus in optimization problems.
- Evaluate double and triple integrals. To learn about Dirichlet integrals, Beta and Gamma functions and to solve related problems

Course:BM-232 Partial Differential Equations

Upon successful completion of the course, students will be able to

- Understand total differential equations and basic concepts of partial differential equations. To learn methods and techniques for solving linear PDEs of first order
- Apply theory of PDEs to determine integral surfaces through a given curve and to find orthogonal surfaces. To understand compatible systems and Charpit method, Jacobi method methods for solving PDEs
- To learn techniques of solving second order PDEs

Course:BM-233 Statics

Upon successful completion of the course, students will be able to

- Learn the concepts of friction and laws of friction, centre of mass and centre of gravity and to solve problems related to these concepts

Year: 2nd Semester: 4th

Course:BM-241 SEQUENCES AND SERIES

Upon successful completion of the course, students will be able to

- Understand basic concepts of real number system and set theory. Preliminary results on neighbourhood of a point, interior and limit points, open sets, closed sets etc.
- Learn real sequences, their limit, boundedness and convergence. To find convergence and divergence of a sequence. To understand Cauchy sequence, subsequence and to prove related theorems.
- Understand infinite series and its basic properties. Attain skills to determine convergence of a series of real numbers by applying various tests.
- Understand absolute and conditional convergence of alternating series and related tests. Learn the basic concepts of pointwise convergence and uniform convergence of sequence and series of functions.

Course:BM-242 SPECIAL FUNCTIONS AND INTEGRAL TRANSFORMS

Upon successful completion of the course, students will be able to

- Understand singular points of a differential equation and to solve such differential equation by power series method. Learn Hypergeometric differential equation, Hypergeometric function and its properties.
- Know Bessel's differential equation and its solution. Understand recurrence relations, generating function and othogonality of Bessel's function. Understand Bessel integral. Attain skills to make use of Bessel functions in scientific problem solving.
- Familiarise with Legendre's differential equation and its solution in the form of Legendre functions. Understand recurrence relations, generating function and othogonality of Legendres function, Rodrigues' formula. Apply knowledge in problem solving.
- Know Hermite's differential equation and its solution in the form of Hermite functions. Understand recurrence relations, generating function and othogonality of Hermite function, Rodrigues' formula.
- Know about Laplace transforms and its properties in detail and to apply those in solving differential equations.
- Familiarize with Fourier transforms of functions, properties of Fourier transform, inverse Fourier transforms and relation between Laplace and Fourier transforms. Develop skill of applying Fourier transforms to solve differential equations.

Course:BM-243 PROGRAMMING IN C & NUMERICAL METHODS

Upon successful completion of the course, students will be able to

- Familiarize with C programming language. Learn elements of C, data types, constants and variables, operations and operators, statements and expressions. Use these tools for writing C programs.
- Learn Input/ Output functions in C, to write reading and writing statements in C, decision making statements and structures in C. Apply this knowledge to use as tools in writing C programs.
- Understand loops and arrays, their types, characteristics and structures. Attain the skill to write C programs which involve arrays and multiple iterations.
- Learn strings of characters, their declaration, input/ output, operations on strings and functions which handle strings. Learn declaration, types and calling of user defined functions in C.
- Understand errors and their types. Learn techniques to obtain numerical solutions of algebraic and transcendental equations.
- Attain numerical skills to find solutions of system of linear equations by different methods.

Year: 3rd Semester: 5th

Course:BM-351 REAL ANALYSIS

Upon successful completion of the course, students will be able to

- Learn basic theory of Riemann integration. Learn fundamental theorem and mean value theorem of integral calculus
- Understand improper integrals and to have knowledge to test their convergence. Understand integral as a function of a parameter. Apply this knowledge for problem solving
- Understand concepts of metric spaces, sub spaces and their properties. Learn open, closed and bounded sets, interior and limit points, Cauchy sequence and completeness
- Learn dense sets, compact and separable metric spaces and related results. Learn important theorems viz. Baire's category theorem, Banach contraction principle, Bolzano–Weierstrass property, Heine–Borel theorem. Use this basic knowledge for life -long learning purposes

Course:BM-352 GROUP and RINGS

Upon successful completion of the course, students will be able to

- Recognize the mathematical objects called groups, their elementary properties, order of a group, subgroup, cyclic groups and their properties
- Understand the notions of cosets, normal subgroups, and quotient groups. Know homomorphisms, isomorphisms and their properties and to prove three isomorphism theorems
- Learn about ring, subring, integral domain, field and ideal and related results
- Understand quotient rings, Euclidean ring, ring homomorphisms, ring isomorphisms and fundamental isomorphism theorems

Course:BM-353 NUMERICAL ANALYSIS

Upon successful completion of the course, students will be able to

- Learn different interpolation and extrapolation methods and their applications. Apply numerical methods to obtain derivatives
- Understand numerical methods for evaluating integrals and solving differential equations and to develop skill of applying these methods for future use in scientific problems

Year: 3rd Semester: 6th

Course:BM-361 REAL AND COMPLEX ANALYSIS

Upon successful completion of the course, students will be able to

- Learn about Beta and Gamma functions and their applications
- Visualize complex numbers as points of $\mathbb{R}^2$and stereographic projection of complex plane on the Riemann sphere. Know De Moivre's Theorem and its Applications. Learn about trigonometric, circular and hyperbolic functions and their properties
- Understand the significance of differentiability and analyticity of complex functions leading to the Cauchy–Riemann equations. Apply knowledge to solve related problems

Course:BM-362 LINEAR ALGEBRA

Upon successful completion of the course, students will be able to

- Understand the concepts of vector spaces, subspaces, bases and their properties; linear transformations and their rank and nullity and to use those concepts for problem solving
- Learn to determine eigen values, eigen vectors and characteristic polynomial of linear transformations and their further use in investigation and solution of problems
- Have knowledge of inner product spaces, orthogonalization and diagonalization of matrices/ linear transformations and to apply that in further learning and for scientific applications
- Learn adjoint operation, Hermitian, unitary, normal and triangular forms of linear transformations and related problem solving

Course:BM-363 DYNAMICS

Upon successful completion of the course, students will be able to

- Learn fundamentals of dynamics like velocity, acceleration, angular velocity and acceleration, Newton's laws of motion, simple harmonic motion and to develop the skill of solving simple dynamical problems
- Understand concepts of work, power, energy and projectile motion and to solve related problems
- Learn about Kepler's laws of the planetary motions

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Course Outcome: Chemistry
Year: 1st Semester: 1st
Course: CH-101 INORGANIC CHEMISTRY
Upon successful completion of the course, students will be able to • Understand the types and energy of orbitals and to use various principles and rules for electronic configuration • Understand the periodic law and significance of periodic classification and to classify the various elements into s,p,d,f, block elements • Understand the geometries of various molecules and structure of various salts and all the parameters used for bond • Make solutions of various molar concentrations • Learn practically about paper chromatography
Course: CH-102 PHYSICAL CHEMISTRY
Upon successful completion of the course, students will be able to • Understand all types of Gas Law's used for gases and theories about gases • Know the critical phenomenon like temperature, pressure, volume and their determination • Have the knowledge of properties of liquids and their determination and for solids and to know kinetics of reactions and all phenomenon related to kinetics • Know about electrolytes and their conduction and measurement of various conductances • Practically learn the phenomenon like viscosity and surface tension and their measurement
Course: CH-103 ORGANIC CHEMISTRY
Upon successful completion of the course, students will be able to • Know the stereochemistry of various organic compounds and nomenclature of organic compounds • Know the mechanism in organic reactions • Know about structure and bonding in various molecules • Learn various reactions of characteristic compounds like alkanes, alkenes • Learn practically to prepare various organic compounds
Year: 1st Semester: 2nd
Course:CH-104 INORGANIC CHEMISTRY
Upon successful completion of the course, students will be able to • Learn Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application • Learn about Metallic bond – Qualitative idea of valence bond and Band theories of

metallic bond (conductors, semiconductors, insulators).

- Learn about General physical properties, low chemical reactivity of nobel gases.
- Learn about Diborane: Preparation, properties and structure (as an example of electron deficient compound and multicenter bonding)
- Learn about Understand Interhalogen compounds (their properties and structures), Hydra and oxy acids of chlorine – structure and comparison of acid strength, cationic nature of Iodine.

Course:CH-105 PHYSICAL CHEMISTRY

Upon successful completion of the course, students will be able to

- Understand about Rate of reaction, rate equation and its types, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst.
- Understand about Order of a reaction, integrated rate expression for zero order, first order, second and third order reactions. Half life period of a reaction.
- Understand about Effect of temperature on the rate of reaction – Arrhenius equation. Theories of reaction rate – Simple collision theory for unimolecular collision. Transition state theory of bimolecular reactions.
- Understand about Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance,equivalent conductance and relation among them, their variation with concentration.

Course:CH-106 ORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Understand about Nomenclature of alkenes, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide. The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes.
- Understand about Nomenclature of benzene derivatives: Aromatic nucleus and side chain.
- Understand about Aromatic electrophilic substitution — general pattern of the mechanism, mechansim of nitration, halogenation, sulphonation, and Friedel-Crafts reaction
- Understand about Aromaticity: theHuckel rule, aromatic ions, annulenes up to 10 carbon atoms, aromatic, anti-aromatic and non-aromatic compounds.
- Understand about Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation of alkynes

Year: 2nd Semester: 3rd

Course:CH-201 INORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about d-block elements and their properties
- Learn about theories, nomenclature, VBT for co-ordination compounds

- Learn about non-aqueous solvents Learn about f-block elements, their properties and their separation
- Know qualitative and quantitative analysis of elements and to learn Beer's and Lambert's law practically
- Have knowledge of preparation of some inorganic compounds

Course:CH-202 PHYSICAL CHEMISTRY

Upon successful completion of the course, students will be able to

- Have the knowledge of thermodynamic phenomenon, Joule Thomson effect and measurement of these phenomenon
- Know about free energy, chemical potential and other related phenomenon
- Have the knowledge of Distribution law and its derivation.
- Have knowledge of cells, electrode and their working.
- Have the practical knowledge of heat of dissolution and heat of neutralization of acid and bases.

Course:CH-203 ORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Know about Ultra Violet spectroscopy and the interpretation of compounds based on the spectroscopy.
- Learn the acidic nature of alcohols and phenols and factors associated with this
- Have knowledge of various functional group containing aldehyde, ketones and their properties and reactions.
- Know the reactions involves for alcohols and phenols and to know Infrared Spectroscopy involved and their examples
- Have practical knowledge to analyze the given organic compound based upon various observations.

Year: 2nd Semester: 4th

Course:CH-204 INORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour, ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds.
- Learn about Actinides: General characteristics of actinides, chemistry of separation of Np, Pu and Am from uranium, Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements.
- Learn about Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination, chemistry of interference of acid radicals including their removal in the analysis of basic radicals

- Learn about common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates

Course: CH-205 PHYSICAL CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycles and its efficiency, Carnot's theorm, Thermodynamics scale of temperature.
- Learn about Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data.
- Learn about Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, Gas criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T.
- Learn about Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells
- Learn about Types of reversible electrodes – metal- metal ion, gas electrode, metal – insoluble salt- anion and redox electrodes. Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential.

Course:CH-206 ORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region
- Learn about characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.
- Learn about Applications of IR spectroscopy in structure elucidation of simple organic compounds
- Learn about Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines.
- Learn about Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides.

Year: 3rd Semester: 5th

Course: CH-301 INORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Have the knowledge of Crystal Filled Theory of transition metal complexes
- Know about the magnetic properties of transition metal complexes and methods to measure it
- Selection rules for d-d transition, spectroscopic ground states, spectrochemical series, orgel energy level diagram for d1 and d9 states, discussion of electronic spectrum of

[Ti(H2O)6] +3 complex ion.

- Practically learn the analysis of inorganic salts
- Learn about the inorganic substances used in biological system like sodium, potassium

Course:CH-302 PHYSICAL CHEMISTRY

Upon successful completion of the course, students will be able to

- Know about ideal and non-ideal solutions and colligative properties.
- Know about the Laws of Photochemistry and other phenomenon like florescence, phosphorescence.
- Have the knowledge black body radiation, quantum mechanical operators and other quantum mechanical phenomenon.
- Practically deduce the pH of acid and basic buffer via pH metrically and also have the knowledge of using different apparatus.
- Have the knowledge of various spectroscopies like UV, IR, Raman spectra and their application.

Course: CH-303 ORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Have the knowledge of NMR Spectroscopy and its application to compounds
- Learn about carbohydrates, their structure determination, reactions and types.
- Know about various polymers and their preparation reactions with their applications.
- Have the knowledge of reactions of amino acids, proteins and their structures.
- Learn about TLC for organic compounds.

Year: 3rd Semester: 6th

Course: CH-304 INORGANIC CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about Arrhenius, Bronsted-lowry, Lux-flood, solvent system and Lewis concept of acids and bases, relative strength of acids and bases.
- Learn about hard and soft acids and bases(HSAB), Applications of HSAB principle.
- Learn about Biological role of Na+, K+, Ca+2, Mg+2, Fe+2 ions, Cooperative effect, Bohr effect.
- Learn about preparation and uses of silicones, elastomers, polysiloxane copolymers, poly phosphazenes and bonding in triphosphazene

Course:CH-305 PHYSICAL CHEMISTRY

Upon successful completion of the course, students will be able to

- Learn about Laws of photochemistry: Grotthus-Drapper law, StarkEinstein law (law of photochemical equivalence), Jablonski diagram depiciting various processes occurring in the excited state,
- Learn about qualitative description of fluorescence, phosphorescence, non-radiative

processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples). • Learn about Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure • Learn about Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point.
Course: CH-306 ORGANIC CHEMISTRY
Upon successful completion of the course, students will be able to • Learn about Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers. • Learn about Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of α-amino acids. • Learn about Structures of peptides and proteins: Primary & Secondary structure. • Learn about Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline. • Learn about the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.

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Course Outcome: Physics

Year: 1st Semester: 1st

Course: PH-101 CLASSICAL MECHANICS AND THEORY OF RELATIVITY

Upon successful completion of the course, students will be able to

- State the conservation principles involving momentum, angular momentum and energy and understand that they follow from the fundamental equations of motion
- Students learn about motion of a particle under central force field

Course: PH-102 ELECTRICITY MAGNETISM AND ELECTROMAGNETIC THEORY

Upon successful completion of the course, students will be able to

- Explain and differentiate the vector and scalar formalisms of electrostatics. Also be able to Apply Gauss's law of electrostatics to solve a variety of problems
- Describe the important properties of magnetic field. Understand the properties and theories of dia-, para- & ferromagnetic materials
- Derive Maxwell equations and understand the role of displacement current, scalar and vector potentials and boundary conditions at the interface between different media. The students will also be able to have basic idea about the propagation of electromagnetic waves
- Analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor

Year: 1st Semester: 2nd

Course:PH-201 Properties of Matter and Kinetic Theory of Gases

- Upon successful completion of the course, students will be able to
- Understand the application of both translational and rotational dynamics motions simultaneously in analyzing rolling with slipping. Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions
- Understand the principles and basic terms related to elasticity through the study of Young Modulus and modulus of rigidity
- Explain the phenomena of simple harmonic motion and the properties of systems executing such motions
- Learn about Kinetic interpretation of Temperature, the real gas equations, Van der Waal equation of state and Brownian motion

Course:PH-202 Semiconductor Devices

Upon successful completion of the course, students will be able to

- Understand the complex electrical networks analysis using different network

theorems

- Understand the basic concepts and different applications of PN junction diode in different type of rectifiers, voltage regulators, solar cell, LED's etc.
- Describe the basic structure, working principle and characteristics of Bipolar Junction transistors.
- Understand and explain the classification of Amplifiers and the various coupling & feedback methods in BJT amplifiers.

Year: 2nd Semester: 3rd

Course:PH-301 COMPUTER PROGRAMMING AND THERMODYNAMICS

Upon successful completion of the course, students will be able to

- Understand the basic concepts of thermodynamics, the first and the second law of thermodynamics, Joule Thomson effect, Joule-Thomson (Porous plug) experiment, the concept of entropy and the associated theorems, calculations of entropy of reversible & irreversible process, T-S diagram and Nernst heat law (third law of thermodynamics)
- Derive the Clausius-Clapeyron and Clausius latent heat equations and understand their significance. The students will also be able to learn about Maxwell's thermodynamic relations their physical interpretations

Course:PH-302 WAVE AND OPTICS-I

Upon successful completion of the course, students will be able to

- Have understanding of Interference - by Division of Wave front, by Division of Amplitude and Interference due to transmitted light & reflected light
- Learn about Huygens-Fresnel's theory, diffraction at a straight edge and at a circular aperture, diffraction due to a narrow slit and due to a narrow wire
- Understand and explain the Fraunhoffer diffraction, dispersive power of grating, Rayleigh's criterion and resolving power of telescope & a grating

Year: 2nd Semester: 4th

Course:PH-401 STATISTICAL PHYSICS

Upon successful completion of the course, students will be able to

- Define and discuss the concepts of microstate and macrostate of a model system
- Define and discuss the concepts and roles of entropy and free energy from the view point of statistical mechanics
- Apply the machinery of statistical mechanics to the calculation of macroscopic properties resulting from microscopic models of magnetic and crystalline systems
- Define the Fermi-Dirac and Bose-Einstein distributions; state where they are applicable; understand how they differ and show when they reduce to the Boltzmann distribution
- Apply the Fermi-Dirac distribution to the calculation of thermal properties of

electrons in metals apply the Bose-Einstein distribution to the calculation of properties of black body radiation
Course:PH-402 WAVE AND OPTICS-II
Upon successful completion of the course, students will be able to • Understand the theories and laws of polarization along with understanding of the production and detection of (i)Planepolarizedlight(ii)Circularly polarizedlightand(iii)Ellipticallypolarizedlight. • Understand the theories of Fourier Series and Fourier Transform. • Have the idea of optical fibres, their properties and principle of propagation of electromagnetic waves through optical fibres.
Year: 3rd Semester: 5th
Course:PH-501 QUANTUM AND LASER PHYSICS
Upon successful completion of the course, students will be able to • Appreciate the beauty of quantum mechanics. They will be knowing all types of representations of operators and ways to apply them in different problems • Solve the hydrogen atom problem by using quantum mechanics • Familiar with optical phenomena and different concepts related laser physics • Qualitative understanding of basic lasing mechanism, types of Lasers, characteristics of Laser Light, types of Lasers • Understand and appreciate the applications of Lasers in developing LED, Holography, in materials processing, in Medicine, Industry and Military
Course:PH-502 NUCLEAR PHYSICS
Upon successful completion of the course, students will be able to • Students shall learn about the knowledge of particles. • Significance of various decays tells the students about the nuclear process • Learn about the spin parity concept & magic no. related to shell. • About the scattering process how it will occur
Year: 3rd Semester: 6th
Course:PH-601 SOLID STATE AND NANO PHYSICS
Upon successful completion of the course, students will be able to • Have brief idea about crystalline and amorphous substances, about lattice, unit cell, primitive cell, miller indices, Bravais lattices in two & three dimensions and crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. • Acquire knowledge about X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods and about the reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c. lattice. • Acquire knowledge about the electronic properties like electrical conductivity, resistivity, thermal conductivity, heat capacity etc. of metallic solids

• Understand the basic idea about superconductors, their classifications and practical applications
Course:PH-602 ATOMIC AND MOLECULAR SPECTROSCOPY
Upon successful completion of the course, students will be able to • Calculate the Zeeman effect and the Lande g-factor • Calculate the effects of an electric field on the energy levels of the hydrogen atom (the Stark effect). • Discuss the rotational spectra of molecules. • Apply the Simple Harmonic Oscillator to determine the vibration spectrum of diatomic molecules. • You will understand how the new theory could explain the fine structure in the spectra of hydrogen and hydrogen-like ions, and how this theory can be extended to atoms which have a single electron in their outermost shell, i.e. the alkali metal atoms. • Learn about fine structure of Hydrogen atoms. • Learn about rotational and vibrational energy levels of diatomic molecules and Raman spectroscopy.

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Course Outcome: Computer Science
Year: 1st Semester: 1st
Course: CS-I COMPUTER AND PROGRAMMING FUNDAMENTALS
Students will learn about • The Organization & Operation of a Computer System • Functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices • System software and Application software • Developing Algorithms for solving for different problems. • Using the internet safely, legally, and responsibly
Course: CS-II PC SOFTWARE
Students will learn about • Windows operating System • Spreadsheet Software basics
Year: 1st Semester: 2nd
Course:CS-I Programming in C
Upon successful completion of the course, Students will be able to • Learning to write programs in C • Learn and develop various controls and branching of logics under various cases using language control structures • Write programs in C language to generate various situations and solving daily routing arithmetic and logical concepts
Course:CS-II Logical Organization of Computers
Students will learn about • Understanding Number Systems, Binary Arithmetic Calculation • How to design Logical Gates, design of Circuits, design of K-Map • How to design Encoder, Decoder, Multiplexer, Demultiplexer
Year: 2nd Semester: 3rd
Course:CS-I DATA STRUCTURE
Students will learn about • Use appropriate data structures for problem solving and programming • Use algorithmic foundations for solving problems and programming • Apply appropriate searching and/or sorting techniques for application development • Develop programming logic and skills
Course:CS-II SOFTWARE ENGINEERING
Students will learn about • Understand the basic concepts of software engineering • Understand the requirement analysis and importance of SRS documentation • Understand the designing principles of software product

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Year: 2nd Semester: 4th
Course:CS-I OBJECT ORIENTED PROGRAMMING WITH C++
Students will learn about • Understand Object-oriented Programming Concepts • Understand Tokens in C++, Control Structures, Functions, Classes • Understand Constructors , Operator Overloading
Course:CS-II OPERATING SYSTEM
Students will come to know about • Describe the important computer system resources and the role of operating system in their management • Understand the process management policies and scheduling of processes by CPU • Analyze the Deadlock situations and their handling methods • Describe and analyze the memory management and its allocation policies • Concepts of File management and File system implementation
Year: 3rd Semester: 5th
Course:CS-I FUNDAMENTALS OF DATA BASE SYSTEMS
Students will learn about • Database Systems and its architecture • Various Database Models • Relational Database Management System
Course:CS-II WEB DESIGNING
Upon successful completion of the course, students will be able to • Structure of Internet and Web • Use simple features of HTML to create, save and view basic web pages
Year: 3rd Semester: 6th
Course:CS-I RELATIONAL DATA BASE MANAGEMENT SYSTEM
Students will learn about • Relational Database Model Concepts • Functional Dependencies • SQL and PL/SQL fundamentals
Course:CS-II COMPUTER NETWORKS
Students will learn about • Fundamentals of computer networking such as types of Networks, Topologies, Connections and Services • Working of reference models of data communication such as OSI and TCP/IP • Working of Networking Devices such as Hub, Repeater, Switch, Bridge, Router and Gateway • Routing algorithms/strategies used by router

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Course Outcome: English
Year: 1st Semester: 1st
Course: EN21 ENGLISH
After successful completion of the course, the students will be able to • The importance of one of the most important literary genres i.e. Poetry and its role in the development of literature, culture and language and in understanding the complexity of various social issues • Certain grammatical components i.e. verbs, nouns, pronoun, adjectives, adverbs, conjunctions, interjection etc. and their uses in sentence formation • The importance of language for effective communication and transmission of information, ideas, thoughts and emotions in the desired manner. • The importance of certain skills of composition i.e. paragraph writing and translation from Hindi into English in conveying the message in proper manner. • The importance of language in the development of literature and vice versa. • Certain tips of how to attempt a paragraph on any topic concerning students' life, social and environmental issues
Year: 1st Semester: 2nd
Course: EN22 ENGLISH
Upon successful completion of the course, the students will be able to • Understand one of the most important genres of literature i.e. essay writing and how literature can be understood through essays • How various social and national issues are dealt with in a comprehensive and socially acceptable manner • The importance of certain composition skills i.e. paragraph writing, translation, letter writing etc. in order to effectively convey the message in official matters

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Course Outcome: Hindi/ Punjabi
Year: 2nd Semester: 3rd
Course: HI23 HINDI
पाठ्यक्रम के सफल समापन पर, छात्र इसके बारे में जानेंगे • विद्यार्थियों को अर्वाचीन कवियों के जीवन और उनकी विचारधारा से अवगत कराया जाता है। ये कवि है - मैथिलीशरण गुप्त , जयशंकर प्रसाद, सूर्यकांत त्रिपाठी 'निराला' ,रामधारी सिंह दिनकर। • निर्धारित निबंधों के माध्यम से निबंध लिखना सिखाया जाता है। • सरकारी और अर्ध सरकारी पत्र लिखने का तरीका बताया जाता है। • वैज्ञानिक शब्दावली सिखाई जाती है।
OR
Course: PU23 PUNJABI
After the completion of the course, students will come to know about • Punjabi Suffi poetry is a glorious asset to Punjabi literature, history and culture. • Short stories give deep messages to the students and enrich students with grammar.
Year: 2nd Semester: 4th
Course: HI24 HINDI
पाठ्यक्रम के सफल समापन पर, छात्र इसके बारे में जानेंगे • संस्मरणों के माध्यम से रचनाकारों - डॉ रामकुमार वर्मा, उपेन्द्रनाथ अश्क, जगदीश चन्द्र माथुर, डॉ लक्ष्मीनारायण लाल, विष्णु प्रभाकर, मोहन राकेश के जीवन से अवगत कराने का प्रयास किया जाएगा। • निर्धारित निबंधों के माध्यम से निबंध लिखना सिखाया जाता है। • अर्ध- सरकारी पत्र और तार लेखन का तरीका सिखाया जाता है। • वैज्ञानिक शब्दावली द्वारा उनके ज्ञान में वृद्धि की जाती है।
OR
Course: PU24 PUNJABI
After the completion of the course, students will come to know about • Punjabi Sufi and kissa kaav will connect the students with social life, Punjabi literature, the human intellect was reached a certain level. • Short Stories give students long lasting messages of life and increase interest of students in Punjabi Literature. • Enhance the knowledge of grammar.