Third Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BSNM-301C	Organic Chemistry-III	3	0	0	25	50	75	3
BSNM-302C	Physical Chemistry-I	3	0	0	25	50	75	3
BSNM-303C	Thermal and Statistical Physics	3	0	0	25	50	75	3
BSNM-304C	Optics and Laser	3	0	0	25	50	75	3
BSNM-305C	Analysis-I	3	0	0	25	50	75	3
BSNM-306C	Differential Equations	3	0	0	25	50	75	3
BSHL-301C	English-III	3	0	0	25	50	75	3
BSHL-302C BSHL-303C	Punjabi-III/Punjab History & Culture-III	3	0	0	25	50	75	3
BSEVS-101C	Environmental Science	2	0	0	25	50	75	2
BSNM-308C	Physics Lab-III	0	0	4	30	20	50	2
BSNM-309C	Chemistry Lab-III	0	0	4	30	20	50	2
	Total	26	0	8	285	490	775	30

Dr Arvind Gupta
Associate Prof

Dr. Karanvir Singh
Professor

Mr Chanchal Jindal
Industrialist

Dr. Gaurav Dhuria
Associate Prof.

Dr. Sushil Kumar
Professor

Dr. Parwinder Singh
Assistant . Professor

Dr. Rohit Mehra
Associate Professor

Dr. Nareshpal Saini
Professor

Dr Gaurav Bhargava
Associate Professor

Dr. Manoj Kumar
Professor

Dr. Lalit Sharma
Professor

Dr. Sangeeta Sharma
Professor

Dr. Vishal Sharma
Associate Professor

Dr. K. Bhushan Aghihotri
Professor

Dr. Kanwaljeet Singh
Professor

Dr. Rakesh Kumar
Associate Prof

Mr K Sunil Behal
Assistant Prof.

Dr. Kiranjeet Kaur
Professor

Fourth Semester

CourseCode	CourseTitle	LoadAllocation			MarksDistribution		Total	Credits
		L	T	P	Internal	External		
BSNM-401C	Inorganic Chemistry-III	3	0	0	25	50	75	3
BSNM-402C	Physical Chemistry-II	3	0	0	25	50	75	3
BSNM-403C	Vibration and Waves	3	0	0	25	50	75	3
BSNM-404C	Elements of Modern Physics	3	0	0	25	50	75	3
BSNM-405C	Analysis-II	3	0	0	25	50	75	3
BSNM-406C	Linear Algebra	3	0	0	25	50	75	3
BSHL-401C	English-IV	3	0	0	25	50	75	3
BSHL-402C BSHL-403C	Punjabi-IV/Punjab History & Culture-IV	3	0	0	25	50	75	3
BSNM-407C	MATHEMATICA Software	0	0	2	30	20	50	1
BSNM-408C	Physics Lab-IV	0	0	4	30	20	50	2
BSNM-409C	Chemistry Lab-IV	0	0	4	30	20	50	2
	Total	24	0	10	290	460	750	29

Dr Arvind Gupta
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Dr Sushil Kumar
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Dr. Parwinder Singh
Assistant . Professor

Dr. Rohit Mehra
Associate Professor

Dr. Nareshpal Saini
. Professor

Dr Gaurav Bhargava
Associate Professor

Dr. Manoj Kumar
Professor

Dr. Lalit Sharma
Professor

Dr. Sangeeta Sharma
Professor

Dr Vishal Sharma
Associate Professor

Dr. Kulbhushan Agnihotri
Professor

Dr. Ramandeep Singh
Professor

Dr. Rakesh Kumar
Associate Prof

Mr K Sunil Behal
Assistant Prof.

Dr. Kiranjeet Kaur
Professor

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-303C			
Subject Title:	Thermal and Statistical Physics			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	**Thermodynamics:** Laws of Thermodynamics: The zeroth law; indicator diagrams, work done, first law, internal energy, Carnot cycle, Carnot's theorem, the second law. Entropy as a thermodynamic variable; reversible and irreversible processes. Principle of increase of entropy. Thermodynamic scale of temperature; its identity with perfect gas scale, impossibility of attaining absolute zero. (10 Lectures)
II	**Maxwell's equations,** application to Clausius-Clapeyron equation and Joule-Thomson effect. Thermodynamic potentials, relation to thermodynamic variables; equilibrium in thermo dynamic systems, simple applications, Thomson and adiabatic cooling, Joule-Thomson expansion; Constancy of U+PV, cooling, liquefaction of gases. Low temperatures: Production and measurement of very low temperatures, adiabatic demagnetization. (10 Lectures)
III	**Statistical Physics:** The statistical basis of thermodynamics: Probability and thermodynamic probability; principle of equal a priori probabilities, probability distribution, its narrowing with increasing n, average properties, fluctuations, micro and macrostates, accessible and inaccessible states. Phase space, division of phase space into cells. (10 Lectures)
IV	**Thermal Dynamics:** Thermal equilibrium between two systems, beta parameter and its identification with (kT)-1, probability and entropy, Boltzmann's entropy relation, statistical interpretation of second law of thermodynamics. Maxwell-Boltzmann statistics, application of M-B statistics to monoatomic gas, principle of equipartition of energy, Bose-Einstein statistics, deduction of Planck's radiation law, derivation of Wiens's displacement law and Stefan's law. Fermi-Dirac statistics, comparison of three types of statistics. (10 Lectures)
	Recommended Books: 1. Statistical Physics and Thermodynamics-V.S. Bhatia, Punjab University, Chandigarh, 1977 2. Thermodynamics and Statistical Physics-Khandelwal and Loknathan, Shivlal Agnawala, Agna, 1979 3. Heat and Thermodynamics-Zemansky and Dittman, Mc Graw HillScience/Engineering/Math-7th edition (Nov,1, 1996)

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-304C			
Subject Title:	Optics and Laser			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	**Interference:** Definition and properties of wave front, Temporal and Spatial Coherence, Young's double slit experiment, Lloyd's single mirror and Fresnel's Biprism. Phase change on reflection, Interference in Thin Films: parallel and wedge-shaped films, Newton's Rings: Measurement of wavelength and refractive index, Interferometer: Michelson Interferometer. (10 Lectures)
II	**Diffraction:** Huygens Principle, Fraunhofer diffraction: Single slit. Circular aperture, Rayleigh criterion of resolution, Resolving Power of a telescope, Double slit, Multiple slits, Diffraction grating, Resolving power of grating, Fresnel diffraction pattern of a straight edge and circular aperture. (10 Lectures)
III	**Polarization:** Plane polarized light, Representation of Unpolarized and Polarized light, Polarization by Reflection, Brewster's law, Malus Law, Polarization by Selective absorption by Crystals, Polarization by Scattering, Polarization by Double Refraction, Nicol Prism. (10 Lectures)
IV	**Laser:** Lasers, Spontaneous emission, Stimulated absorption, Stimulated emission, Einstein coefficients, Einstein relations, Conditions for Laser actions, Population inversion, Different types of Laser Pumping mechanism: Optical Pumping, Electric Discharge and Electrical pumping, Resonators, Two, Three and Four level laser systems, Ruby laser, He-Negas Laser, CO2 laser, applications of laser: Holography, Spectroscopy and Laser welding. (10 Lectures)
	Recommended Books: 1. Optics: A.K. Ghatak (Tata-McGraw Hill), 1992. 2. Fundamentals of Optics: F.A. Jenkins and H.E. White (McGraw Hill), 1981. 3. Introduction to Modern Optics (2nd ed.), G.R. Fowles, Dover, ISBN 0-486-65957-7, 2012. 4. Fundamentals of Optics, F.A. Jenkins & H.E. White, McGraw-Hill, 2011. 5. Schaum's Outline of Theory and Problems of Optics, E. Hecht, McGraw-Hill,ISBN 0-07-027730-3,1998.

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-308C			
Subject Title:	PHYSICS LAB-III			
Contact Hours:	L:0	T:0	P:4	Credits:2

At least 08 experiments from the following:

1. To study the laser beam characteristics like; wave length using diffraction grating aperture & divergence.
2. Study of diffraction using laser beam and thus to determine the grating element.
3. To study laser interference using Michelson's Interferometer.
4. To study wavelength of sodium light using Newton Rings.
5. To determine the numerical aperture of a given optic fibre and hence to find its acceptance angle.
6. To find the refractive index of a material/glass using spectrometer.
7. To find the refractive index of a liquid using spectrometer
8. To find the velocity of ultrasound in liquid.
9. To determine the specific rotation of sugar using Laurent's half-shade polarimeter.
10. To determine the coefficient of thermal conductivity of a bad conductor using Lee's disc apparatus.
11. To compare heat transfer between different material surface and the black body surface by radiation.
12. To find the emissivity of different material surface.

REFERENCE BOOKS:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. Engineering Practical Physics, S.Panigrahi & B. Mallick,2015, Cengage Learning India Pvt. Ltd.
4. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.
5. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 201, Kitab Mahal.
6. B Sc. Practical Physics, C. L. Arora, S. Chand & Co.
7. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-403C			
Subject Title:	Vibration and Waves			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	**Simple and Damped Harmonic Motion:** Simple harmonic motion, energy of a SHO, Compound pendulum, Torsional pendulum, Electrical Oscillations, Lattice Vibrations, Transverse Vibrations of a mass on a string, Anharmonic Oscillations. Damped simple harmonic motion, Decay of free Vibrations due to damping, types of damping, Determination of damping coefficients – Logarithmic decrement, relaxation time and Q-factor. Electromagnetic damping. (10 Lectures)
II	**Forced Vibrations and Resonance**: Forced mechanical and electrical oscillator, Transient and Steady State Oscillations, Displacement and velocity variation with driving force frequency, Variation of phase with frequency resonance, Power supplied to forced oscillator by the driving force. Q-factor and band width of a forced oscillator, Electrical and nuclear magnetic resonances. (8 Lectures)
III	**Coupled Oscillations**: Stiffness coupled oscillators, Normal coordinates and modes of vibrations. Inductance coupling of electrical oscillators, Normal frequencies, Forced vibrations and resonance for coupled oscillators, Masses on string-coupled oscillators. (8 Lectures)
IV	**Waves in Physical Media**: Types of waves, wave equation (transverse) and its solution characteristics impedance of a string, Impedance matching, Reflection and Transmission of waves at boundary, Energy of vibrating string, wave and group velocity. (10 Lectures)
	Recommended Books: 1. Text Book of Vibrations and Waves: S.P. Puri (Macmillan India), 2004. 2. The Physics of Vibrations and Waves: H.J. Pain (Wiley and ELBS), 1976.

Ranjeet Ram

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-404C			
Subject Title:	Elements of Modern Physics			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	**Dual Nature of Waves and Particles:** Black body ration, Planck's quantum, Planck'sconstant and light as a collection of photons; Photo Electric effect and Comptonscattering. De Broglie wavelength and matter waves; Davisson-Germer experiment, Problems with Rutherford model- instability of atoms and observation of discrete atomicspectra; Bohr's quantization rule and atomic stability; Wave-particle duality, Heisenberguncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle. Lecture (10)
II	**Quantum Mechanics:** Two slit interference experiment with photons, atoms & particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wavefunction, probabilities and normalization; Probability and probability current densities in one dimension. One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as an example Lecture (10)
III	**Atomic structure:** The nuclear atom, Electron orbits, Atomic spectra, The Bohr Model,Energy level and spectra, Correspondence principle, Nuclear motion, Atomic excitation,Many electron atoms, Exclusion Principle, electron spin, spin orbit coupling, X-ray spectra. Zeeman effect, Stern-Garlach experiment. Lecture (10)
IV	**Special Theory of Relativity:** Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation ofvelocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy- Momentum Four Vector. Lecture (10)

Recommended Books:

1. Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill
2. Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson,2009, PHI Learning
3. Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003. McGraw Hill
4. Quantum Physics, Berkeley Physics, Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
5. Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning

Kiranjeet Kaur

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-408C			
Subject Title:	Physics Lab-IV			
Contact Hours:	L:0	T:0	P:4	Credits:2

At least 08 experiments from the following:

1. To determine the value of horizontal component of Earth's magnetic field Bh.
2. To determine unknown capacitance by flashing and quenching method.
3. To study the magnetic field of a circular coil carrying current.
4. To find out polarizability of a dielectric substance.
5. To determine the frequency of an electrically maintained tuning fork by i) Transverse mode of vibration ii) Longitudinal mode of vibration.
6. Measurement of Planck's constant using black body radiation and photo-detector.
7. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energyof photo-electrons versus frequency of light.
8. To determine work function of material of filament of directly heated vacuum diode.
9. To determine the Planck's constant using LEDs of at least 4 different colours.
10. To determine the wavelength of H-alpha emission line of Hydrogen atom.

REFERENCE BOOKS:

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.
4. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.
5. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 201, Kitab Mahal.
6. B Sc. Practical Physics, C. L. Arora, S. Chand & Co.
7. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-305C			
Subject Title:	ANALYSIS-1			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	Series of non-negative terms, P-test, comparison tests, Cauchy's integral test, Cauchy's root test, D'Alembert ratio test, Raabe's test, De Morgan and Bertrand's test, Gauss' test, logarithmic test, Alternating series, absolute and conditional convergence, rearrangement of absolutely convergent series. (10 Lectures)
II	Riemann integral, integrability of continuous and monotonic functions, properties of integrable functions, the fundamental theorem of integral calculus, mean value theorems of integral calculus. (10 Lectures)
III	Improper integral and their convergence, comparison tests, absolute and conditional convergence, Abel's and Dirichlet's test. (10 Lectures)
IV	Beta and Gamma functions, properties of Gamma function, transformation of Gamma function, symmetrical property of Beta function, transformation of Beta function, relation between Beta and Gamma functions. (10 Lectures)
	Recommended Books: 1. Shanti Narayan and M. D. Raisinghania, Elements of Real Analysis, S. Chand, 2018 2. Robert Wrede and Murray R. Spiegel, Advanced Calculus, 3rd Edition, Schaum's OutlineSeries (McGraw Hill), 2010. 3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983. 4. S C Malik and Savita Arora, Mathematical Analysis, New Age International Publishers,2017

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-306C			
Subject Title:	DIFFERENTIAL EQUATIONS			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	Exact differential equations, first order and higher degree equations solvable for x, y and p=dy/dx. Clairaut's form, singular solution as an envelope of general solutions. Geometric meaning of a differential equation. Linear differential equations with constant coefficients. (10 Lectures)
II	Linear differential equations with variable coefficients: Cauchy and Legendre equations. Linear differential equations of second order- transformation of the equation by changing the dependent variable/ the independent variable, methods of variation of parameters and reduction of order. (10 Lectures)
III	Partial differential equation: Formation of first and second order equations, linear equation of first order and integral surfaces. (10 Lectures)
IV	Lagrange's linear equation. Nonlinear first order partial differential equations: Charpit's method. Classification of higher order partial differential equation. (10 Lectures)
	Recommended Books: 1. W E Boyce and R C DiPrima, Elementary Differential Equations and Boundary ValueProblems, 9th Edition, Wiley, 2009. 2. R K Jain and S R K Iyengar, Advanced Engineering Mathematics, 4th Edition, NarosaPublishing House Pvt LtD, New Delhi, 2012 3. I N Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1957 4. S L Ross, Differential Equations, John Wiley & Sons, 2004 5. M D Raisinghania, Advanced Differential Equations, 19th Edition, S. Chand, 2018

Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSNM-405C**			
Subject Title:	**ANALYSIS-II**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Details of the Course

Unit	Content
I	Sequence and series of functions: pointwise and uniform convergence, Cauchy's criterion for uniform convergence, Test (M_n -test) for uniform convergence, uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation. Abel's test, Dirichlet's test and Weierstrass approximation theorem (Statement only). (15 Lectures)
II	Vector differentiation, Gradient, Divergence and Curl with their properties and applications. (5 Lectures)
III	Vector Integration: Line, Surface and Volume integration. Gauss divergence theorem, Stokes'theorem, Green's theorem. (10 Lectures)
IV	Fourier series: Fourier expansion of piecewise monotonic functions, Fourier series for odd and even functions, half range series. Fourier series in the interval $[0, 2\pi]$, $[-1,1]$ and $[a, b]$. (10 Lectures)
	Recommended Books: 1. Tom Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985. 2. Shanti Narayan, M. D. Raisinghania, Elements of Real Analysis, S. Chand & Company,2018. 3. S. C. Malik, Savita Arora, Mathematical Analysis, New Age International Publishers,2017. 4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons Inc, NewYork, 1999.

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSNM-406C			
Subject Title:	LINEAR ALGEBRA			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the Course

Unit	Content
I	Vector Space: Definition and Examples of Vector Spaces, Subspaces, Algebra of subspaces, Linear span, Linear dependence and independence of vectors, Basis and dimension of a vector space, Basis and dimension of subspace. (10 Lectures)
II	Linear transformations, Rank and Nullity of a linear transformation, Vector space of linear transformations. Linear transformations and matrices, Change of basis. (10 Lectures)
III	Linear independence of row and column vectors, row rank, column rank and rank of a matrix andtheir equivalence. Applications of matrices to a system of linear equations (both homogeneous and non-homogeneous). Theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous). (10 Lectures)
IV	Eigenvalues, eigenvectors and characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding inverse of a matrix. Diagonalization. (10 Lectures)
	Recommended Books: 1. P. B. Bhattacharya, S. K. Jain, S. R. Nagpaul, First Course in Linear Algebra, New Age International Publishers, 2015. 2. Bernard Kolman, David R. Hill, Elementary Linear Algebra with Applications, Pearson, 2007. 3. Vivek Sahai, Vikas Bist, Linear Algebra, Narosa, 2017.

Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSNM-407C**			
Subject Title:	**MATHEMATICA Software**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Details of the Course

Unit	Content
I	The structure of MATHEMATICA, notebook interfaces, constants, variables, algebraic calculations, four kinds of brackets, lists, tables, expressions, functions, built-in functions, functional operations, graphics, patterns, manipulating lists, transformation rules, evaluation of expressions, modularity, manipulating notebooks, relational and logical operators.
II	Symbolic math commands: D; Integrate; Sum; Product; Solve; Eliminate; Reduce; Series; Limit;Minimize; Programming: conditionals; loops: Do; For and While.
	Recommended Books: 1. Wolfram, S., The MATHEMATICA Book, 5th revised edition. Wolfram Media Inc, 2004. 2. Abell, M. and Braselton, J., Mathematica by Example, 5th Edition. Academic Press,20

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Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSHU-301C**			
Subject Title:	**ENGLISH-III**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Details of the Course:

Unit	Content
I	The following **short novel** to be read for enhancing vocabulary and learning sentence/speech construction: The Strange Case of Dr. Jekyll and Mr. Hyde by Robert Louis Stevenson
II	**Grammar:** Parts of Speech, Adjectives and its degrees, Simple, Compound and complex structures, Active and passive voices, Subject-verb agreement, Punctuation, Spelling rules and formation of words.
III	**Writing Skills:** Reportwriting, Letter writing: Business and official letters, notices and memorandums, Précis writing.
IV	**Language Skills:** Comprehension, Public speaking/Oral communication, Translation (Punjabi into English), Technical words/vocabulary
	Recommended Books: Robert Louis Stevenson, The Strange Case of Dr, Jeykll and Mr. Hyde, Madhuban Publications, 2005. Wren and Martin, High School English Grammar and Composition, S Chand (Indian edition),2008. A J Thomson and A V Martinet, A Practical English Grammar, Oxford India, 2007. RV Lesikar, M E Flatley, K Rentz and N Pande, Business Communication(Making Connections in Digital World), Tata McGraw Hill, 2010 M Frank, Writing as Thinking: A Guided Process Approach, Eaglewood Cliffs, Prentice Hall Regents.

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SEMESTER-IV

Course Name	B.Sc. (Non-Medical)			
Subject Code:	BSHU-401C			
Subject Title:	ENGLISH-IV			
Contact Hours:	L:3	T:0	P:0	Credits:3

Details of the course:

Unit	Contents
I	**Textbook entitled 'Prism: Spoken and Written Communication, Prose & Poetry' published by Orient Longman** **<u>For enhancing vocabulary and learning sentence/speech construction:</u>** **I. Prose:** 1) Socrates and the Schoolmaster – F. L. Brayne 2) With the Photographer – Stephen Leacock **II. Poetry:** 1) On Television – Roald Dahl 2) Say Not the Struggle Naught Availeth – Arthur Hugh Clough 3) Abou Ben Adhem – James Leigh Hunt
II	**Grammar and Vocabulary:** Transformation of sentences; Tenses; Active/Passive Voice; Narration
III	**Reading & Writing Skills:** Analytical reports; Drafting of career documents: Job Applications/ Resume/CV
IV	**Spoken Skills** 1. Getting People's Attention and Interrupting 2. Giving Instructions and Seeking Clarifications 3. Making Requests and Responding to Requests 4. Asking for Directions and Giving Directions 5. Thanking Someone and Responding to Thanks 6. Inviting and Accepting and Refusing an Invitation 7. Apologizing and Responding to an Apology 8. Asking for, Giving and Refusing Permission

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Semester-III

CourseName	**B.Sc.(Non-Medical)**			
SubjectCode:	**BSHU-302C**			
SubjectTitle:	**PUNJABI-III**			
ContactHours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Unit	Contents	Contact Hours
I	ਕਵਿਤਾ ਭਾਗ: ਭਾਈ ਵੀਰ ਸਿੰਘ: ਸਮਾਂ, ਚਸ਼ਮਾ ਪ੍ਰੋ. ਪੂਰਨ ਸਿੰਘ: ਪੰਜਾਬ ਨੂੰ ਕੂਕਾਂ ਮੈਂ, ਹੱਲ ਵਾਹੁਣ ਵਾਲੇ ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ: ਮਾਂ, ਕੋਈ ਆਇਆ ਸਾਡੇ ਵਿਹੜੇ, ਪਿਆਰ ਪੰਧ ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ: ਆਖਾਂ ਵਾਰਿਸ ਸ਼ਾਹ ਨੂੰ, ਅੰਨਦਾਤਾ	12
II	ਕਹਾਣੀ ਭਾਗ: ਸੰਤ ਸਿੰਘ ਸੇਖੋ: ਮੁੜ ਵਿਧਵਾ ਸੁਜਾਨ ਸਿੰਘ: ਕੁਲਫੀ ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ: ਤੂੜੀ ਦੀ ਪੰਡ ਗੁਰਦਿਆਲ ਸਿੰਘ: ਸਾਂਝ	11
III	ਸਵਰ ਤੇ ਵਿਅੰਜਨ ਧ੍ਵਨੀਆਂ ਦਾ ਨਿਖੜਾ ਤੇ ਵਰਗੀਕਰਨ ਦੁੱਤ ਵਿਅੰਜਨ ਤੇ ਸੰਯੁਕਤ ਵਿਅੰਜਨ ਅਗੇਤਰ, ਪਿਛੇਤਰ	12
IV	ਪੰਜਾਬੀ ਦਿਆਂ ਧੁਨੀਆਂ ਦੇ ਪਰਿਵਰਤਨ ਦੀਆਂ ਦਿਸ਼ਾਵਾਂ : ਲੋਪ, ਆਗਮ, ਵਿਕਾਰ, ਵਿਸ਼ਮੀਕਰਨ, ਵਿਪਰਜ।	10

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Semester-IV

Course Name	**B.Sc.(Non-Medical)**			
SubjectCode:	**BSHU 402C**			
SubjectTitle:	**Punjabi-IV**			
ContactHours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Detailsof theCourse

Unit	Contents	Contact Hours
I	ਡਾ. ਹਰਿਭਜਨ ਸਿੰਘ: ਅਪ੍ਰਮਾਣਿਕ, ਮਨ ਪਰਦੇਸੀ ਹੋਏ ਸਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ: ਕੰਡਿਆਲੀ ਥੋਰ, ਧਰਮੀ ਬਾਬਲ ਪਾਪ ਕਮਾਇਆ, ਰੁੱਖ ਪਾਸ਼: ਇਨਕਾਰ, ਸਭ ਤੋਂ ਖਤਰਨਾਕ, ਦਹਿਕਦੇ ਅੰਗਿਆਰਾ 'ਤੇ ਸੁਰਜੀਤ ਪਾਤਰ: ਹੁਣ ਘਰਾਂ ਨੂੰ ਪਰਤਣਾ, ਕੁਝ ਕਿਹਾ ਤਾਂ....,ਪੁਲ ਕਰਨਜੀਤ ਕੋਮਲ: ਸ਼ਬਦ-ਸਮਾਧੀ	12
II	ਕਹਾਣੀ ਭਾਗ: ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ: ਕੋਈ ਇਕ ਸਵਾਰ ਪ੍ਰੇਮ ਪ੍ਰਕਾਸ਼: ਲੱਛਮੀ ਮੋਹਨ ਭੰਡਾਰੀ: ਘੋਟਣਾ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ: ਆਪਣਾ ਆਪਣਾ ਹਿੱਸਾ	11
III	ਕੰਪਿਊਟਰ ਦੀ ਪਰਿਭਾਸ਼ਾ,ਡਾਟਾ ਸਟੋਰੇਜ ਡਿਵਾਈਸਜ, ਟਾਈਪਿੰਗ ਦੀ ਮਹੱਤਤਾ, ਫਾਈਂਡ ਐਂਡ ਰੀਪਲੇਸ: ਫਾਈਂਡ ਐਂਡ ਚੇਜ ਦ ਟੈਕਸਟ, ਸਪੈਲ ਚੈੱਕਰ	12

	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਤੇ ਇੰਟੇਰਨੈੱਟ : ਈ. ਨਿਊਜਪੇਪਰ, ਵਿਕੀਪੀਡੀਆ	
IV	ਸਾਹਿਤ ਦੇ ਰੂਪ : ਕਵਿਤਾ, ਵਾਰਤਕ, ਕਹਾਣੀ, ਨਾਵਲ	10

Reference Books

S. No.	Author (s)	Title of The Book	Publisher/ Year
1.	ਡਾ. ਮਹਿਲ ਸਿੰਘ (ਸੰਪ.)	ਸਾਹਿਤ ਦੇ ਰੰਗ	ਰਵੀ ਸਾਹਿਤ ਪ੍ਰਕਾਸਨ, ਅਮ੍ਰਿਤਸਰ।
2.	ਡਾ. ਸੁਖਵਿੰਦਰ ਸਿੰਘ ਸੰਘਾ	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਵਿਗਿਆਨ	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਕਾਦਮੀ, ਜਲੰਧਰ
3.	ਰਤਨ ਸਿੰਘ ਜੱਗੀ	ਸਾਹਿਤ ਦੇ ਰੂਪ	ਪੰਜਾਬੀ ਯੂਨੀਵਰਸਿਟੀ, ਪਟਿਆਲਾ

SHAHEED BHAGAT SINGH STATE UNIVERSITY
MOGA ROAD, FEROZEPUR-152004

Semester-I

Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSHU-103C**			
Subject Title:	**Punjab History & Culture**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Detail of Course

Unit	Content
I	1. Physical Features of the Punjab and Impact on History. 2. Sources of the ancient history of Punjab.
II	3 Harappan Civilization: Town planning; Social, economic, and religious life of the Indus Valley people. 4 The Indo-Aryans: Original home and settlement in Punjab.
III	5. Social, Religious, and Economic life during later Rig Vedic age. 6. Social, Religious, and Economic life during later Vedic Age.
IV	7. Teaching and impact of Buddhism. 8. Jainism in the Punjab.
	Recommended Books: 1. L. joshi (ed): History and Culture of the Punjab, Art-1, Patiala, 1989(3rd edition) 2. L.M joshi and fauja singh (ed); History of Punjab, Vol.I, Patiala 1977. 3. Budha Parkash: Glimpses of Ancient Punjab, Patiala, 1983. 4. B.N Sharma: life in Northern India, Delhi. 1966.

SHAHEED BHAGAT SINGH STATE UNIVERSITY
MOGA ROAD, FEROZEPUR-152004

SEMESTER-III

Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSHU-303C**			
Subject Title:	**Punjab History & Culture-III**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Details of the Course

Unit	Content
I	Social, Religious and Economic life during the Rig Vedic Age
II	Alexandra's invasion and its impact. Punjab under Chandragupta Maurya and Ashoka.
III	The Kushans and their contribution to the Punjab. The Punjab under the Gupta Emperor. The Punjab under the Vardhana Emperors.
IV	The Punjab from 7th Century to 1000 A.D. (A Survey of Political and Socio-cultural History of Punjab. Development of Art and Architecture of Punjab.
	Recommended Books: 1. L.M. Joshi (ed): History and Culture of the Punjab, Art-I, Patiala, 1989 (3rd edition) 2. L.M. Joshi and Fauja Singh (ed); History of Punjab, Vol. I, Patiala, 1977. 3. Budha Prakash: Glimpses of Ancient Punjab, Patiala, 1983. 4. B.N. Sharma: Life in Northern India, Delhi, 1966.

SHAHEED BHAGAT SINGH STATE UNIVERSITY

MOGA ROAD, FEROZEPUR-152004

Semester-IV

Course Name	**B.Sc. (Non-Medical)**			
Subject Code:	**BSHU-403C**			
Subject Title:	**Punjab History & Culture IV**			
Contact Hours:	**L:3**	**T:0**	**P:0**	**Credits:3**

Details of the Course

Unit	Content
I	Guru Gobind Singh and the Khalsa Banda Singh Bahadur: Conquests and Execution
II	Sikh Struggle for Sovereignty Sikh Misls Ranjit Singh: Conquests, Administration and the Anglo-Sikh Relations Anglo-Sikh Wars and the Annexation
III	The Punjab under the British: New Administration, Education and Social Change
IV	Socio-Religious Reform Movements Role of Punjab in the Freedom Struggle
	Recommended Books: 1. Kirpal Singh (ed.): History and Culture of the Punjab, Part-II, Punjabi University, Patiala, 1990. 2. Fauja Singh (ed.): History of Punjab, Vol. III, Punjabi University, Patiala, 1987. 3. J.S. Grewal: The Sikhs of the Punjab, CUP, Cambridge, 1991. 4. Sukhwant Singh. Agricultural Growth under Colonial Constraints: The Punjab 1849-1947, Manpreet Publication, Delhi, 2000. 5. Khushwant Singh, A History of the Sikhs, Vol. I, OUP, New Delhi, 1990.

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester – III

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-301C**
Subject Title	**Organic Chemistry - III**
Contact Hours	**L:3 ; T:0 : P:0**
Credits	**3**

Details of the course:

Unit	Contents
I **12 Hrs**	**Carboxylic Acids:** Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Synthesis of acid chlorides, esters and amides. Reduction of carboxylic acids. Mechanism of decarboxylation. Carboxylic Acids Derivatives: Structure and nomenclature of acid chlorides, esters, amides and acid anhydrides, Relative stability & reactivity of acyl derivatives, Physical properties, inter conversion of acid derivatives by nucleophilic acyl substitution, Preparation of carboxylic acid derivatives, chemical reactions. Mechanisms of esterification and hydrolysis (acidic and basic).
II **12 Hrs**	**Ethers and Epoxides:** Nomenclature of ethers and methods of their formation, physical properties. Chemical reaction cleavage and autoxidation, Ziesel's method. Synthesis of epoxides. Acid and base catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides. **Organometallic Compounds:** Organomagnesium Compounds: The Grignard reagents-formation, structure and chemical reactions. Organolithium Compounds: Formation and chemical reactions. Organozinc and Organocopper Compounds: Nomenclature, structural features, Methods of formation and chemical reactions.
III **11 Hrs**	**Organic Compounds of Nitrogen:** Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanisms of nucleophilc substitution in nitroarenes and their reduction in acidic, neutral and alkaline media. Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction and Hofmann bromamide reaction. Physical properties. Stereochemistry of amines. separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts.
IV **10 Hrs**	**Heterocyclic Compounds:** Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.
	Recommended Books: 1. Organic Chemistry, Morrison and Boyd, Prentice Hall 2. Organic Chemistry. F.A. Carey, McGraw Hill, Inc. 8th edition. 2. O 3. Introduction to organic chemistry, Stritwieser, Heathcock and Kosover, Macmilan. 4. Organic ChemistryVol. I, II & III, S.M. Mukherji, S.P. Singh and R.P.Kapoor, Wiley Eastern Ltd (New Age International).

	5. Heterocyclic Chemistry, T.L. Gilchrist, Longman Scientific Technical Press (2006). 6. Heterocyclic Chemistry, J.A. Joule, K. Mills and G.F. Smith, 3rd edition, Indian reprint, 2004. Chennai Microprint Pvt. Ltd.

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester – III

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-302C**
Subject Title	**Physical Chemistry - I**
Contact Hours	**L:3 ; T:0 : P:0**
Credits	**3**

Details of the course:

Unit	Contents
I **15 Hrs**	**Gaseous state:** Kinetic molecular theory of gases, derivation of kinetic gas equation, deduction of gas laws from kinetic gas equation, imperfection in real gases, the compressibility of real gases, isotherms of real gases, equations of state, Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.
II **10 Hrs**	**Liquids state:** Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Liquid crystals: Difference between liquid crystal, solid and liquid, Classification, structure of nematic and cholestric phases.
III **08 Hrs**	**Colloidal State:** Definition of colloids, classification of colloids. Solids in liquids (Sol): kinetic, optical and electrical, properties, stability of colloids, protective action, Hardy Schulze law, gold number. Liquids in liquids (emulsions): Types of emulsions, preparation. Emulsifiers. General applications of colloids. Explanation of cleansing action of detergents.
IV **12 Hrs**	**Solutions:** Dilute Solutions and Colligative Properties Ideal and non–ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, Law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass degree of dissociation and association of solutes.
	Recommended Books: 1. Physical Chemistry, K.J. Laidler. 2. Physical Chemistry, Ball, D. W. ; Thomson Press, India (2007). 3. Principles of physical chemistry, S.H. Maron & C.F. Prutton. 4. Physical Chemistry, Castellan, G. W.; 4th Ed. Narosa (2004). 5. Physical Chemistry, Atkins, P. W. & Paula, J. de Atkin's Ed., Oxford University, Press (2006).

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester –III

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-309C**
Subject Title	**Chemistry Lab- III**
Contact Hours	**L:0 ; T:0 : P:4**
Credits	**2**

Details of the course:

Unit	Contents
I	**Organic Chemistry Laboratory Techniques :** Thin Layer Chromatography Determination of Rf values and identification of organic compounds. 1. Separation of green leaf pigments (spinach leaves may be used). 2. Preparation and separation of 2, 4. dinitrophenylhydrazones of acetone, 2-butone, 2-Butanone, hexan-2 and 3-one using toluene and light petroleum (40 : 60). 3. Separation of a mixture of dyes using cyclohexane and ethyl acetate
II	**Physical Chemistry Experiment Chemical Kinetics :** 1. To determine the specific reaction rate of the hydrolysis of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room temperature. 2. To study the effect of acid strength on the hydrolysis of an ester. 3. To determine the viscosity and surface tension of C_2H_5OH and glycerine solution in water 4. Calculation of the enthalpy of ionization of ethanoic acid.
	Recommended Books: 1. Practical Organic Chemistry by F.G. Mann and B.C. Saunders. 2. Practical Inorganic Chemistry by J.R. Barrante G. Marr and B.W. Rockett 3. Vogel's Inorganic Quantitative Analysis. 4. Advanced Practical Physical Chemistry by J.B. Jadav.

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester –IV

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-401C**
Subject Title	**Inorganic Chemistry - III**
Contact Hours	**L:3 ; T:0 : P:0**
Credits	**3**

Details of the course:

Unit	Contents
I **13 Hrs**	**Coordination Compounds:** Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.
II **12 Hrs**	**Non-aqueous Solvents:** Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3, liquid SO_2 and Ionic liquids . Oxidation and Reduction, Use of redox potential data-analysis of redox cycle, redox stability in water-Frost, Latimer and Pourbaix diagrams.
III **10 Hrs**	**Chemistry of Lanthanide Elements:** Electronic structure, oxidation states and ionic radii and lanthanide contraction, Electronic absorption and magnetic properties of lanthanides. **Chemistry of Actinides:** General features and chemistry of actinides, similarities between the later actinides and the later lanthanides. Electronic and magnetic properties of actinides and their general comparison with the lanthanide elements.
IV **10 Hrs**	**Bioinorganic Chemistry:** Essential and trace elements in biological processes, metalloporphyrins and special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca2+ .
	Recommended Books: 1. J.D. Lee, Concise Inorganic Chemistry, 4th Ed. 2. J.E. Hüheey, Inorganic Chemistry, Harper & Row 3. F.A.Cotton and G. Wilinson, Advanced Inorganic Chemistry, Interscience Publisher 4. N.N. Greenwood and A. Earnshaw, Chemistry of Elements, Pergamon Press. 5. D.F.C. Shriver, P.W. Atkins and C.H. Langford, Inorganic Chemistry, ELBS Oxford, 1991.

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester – IV

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-402C**
Subject Title	**Physical Chemistry - II**
Contact Hours	**L:3 ; T:0 : P:0**
Credits	**3**

Details of the course:

Unit	Contents
I **10 Hrs**	**Thermodynamics-I:** Definition of thermodynamic terms: System, surroundings etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law-Joule-Thomson coefficient and inversion temperature, Calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.
II **13 Hrs**	**Thermodynamics-II:** Second Law of Thermodynamics: Need for the law, different statements of the law, Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of Entropy : Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, Clausius inequality, entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases. **Thermochemistry:** Standard state, standard enthalpy of formation-Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy. Kirchhoff's equation.
III **12 Hrs**	**Thermodynamics-III:** Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entrop y change, Variation of G and A with P, V and T. **Equilibrium:** Chemical Equilibrium, Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of Kp, Kc, Ka and their relationship, Clausius-Clapeyron equation, applications.
IV **10 Hrs**	**Introduction to Phase Equilibrium:** Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2 and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic-Bi-Cd, Pb-Ag systems, desilverisation of lead. Solid solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, ($NaCl-H_2O$), $FeCl_3-H_2O$) and $CuSO_4-H_2O$) system. Freezing mixtures, acetone-dry ice. Non-ideal system-azeotropes-$HCl-H_2O$ and ethanol water system. Partially miscible liquids Phenol-water, trines-thylamin-water, Nicotine-water

	System. Lower and upper consulate temperature, Effect of impurity on consolute temperature, immiscible liquids, steam distillation. Nernst distribution law.
	Recommended Books: 1. Physical Chemistry, K.J. Laidler. 2. Physical Chemistry, Vol.2, K.L. Kapoor. 3. Principles of physical chemistry, S.H. Maron & C.F. Prutton. 4. Chemical Thermodynamics, P.A. Rock 5. Physical Chemistry, Atkins, P. W. & Paula, J. de Atkin's Ed., Oxford University, Press (2006). 6. Thermodynamics for Chemists, S. Glasstone.

Shaheed Bhagat Singh State University, Ferozepur
B.Sc (Non-Medical) Batch 2022 onwards

Semester –IV

Course Name	**B.Sc (Non-Medical)**
Subject Code	**BSNM-409C**
Subject Title	**Chemistry Lab- IV**
Contact Hours	**L:0 ; T:0 : P:4**
Credits	**2**

Details of the course:

Unit	Contents
I	**Quantitative Analysis Volumetric Analysis :** 1. Determination of acetic acid in commercial vinegar using NaOH. 2. Determination of alkali content-antacid tablet using HCI. 3. Estimation of calcium content in chalk as calcium oxalate by permanganometry. 4. Estimation of hardness of water by EDTA. 5. Estimation of ferrous and ferric by dichromate method. 6. Estimation of copper using sodiumthiosulphate. Gravimetric Analysis Analysis of Cu as CuSCN and Ni as Ni (dimethylgloxime)
II	**Physical Chemistry:** 1. To determine the specific reaction rate of hydrolysis of ethyl acetate catalysed by Hydrogen ions at room temperature. 2. To study the effect of acid strength on hydrolysis of an ester. Viscosity, Surface Tension (Pure Liquids). 3. To study the viscosity and surface tension of CCI glycerine solution in water. 4. To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution process. 5. To determine the enthalpy of neutralisation of a weak acid/weak base versus strong base/strong acid and determine the enthalpy of ionisation of the weak acid/weak base. 6. To determine the enthalpy of dissolution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.
	Recommended Books: 1. G. Marr and B.W. Rocket,'Practical Inorganic Chemistry', University Science ,1999. 2. G. Pass and H. Sutcliffe, 'Practical Inorganic Chemistry', 2ndEdn., Chapman and Hall, London, 1974. 3. J. Mendham, R.C. Denney, J.D. Barnes, M.Thomas, 'Vogel's Textbook of Quantitative Analysis', 5thEdn., Pearson Education,2006. 4. G. Svehla, 'Vogel's Textbook of Quantitative Analysis', Pearson Education, 2006. 5. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., 6. Vogel's Inorganic Quantitative Analysis. 4. Advanced Practical Physical Chemistry by J.B. Jadav.