Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B.Sc. (Life Science / Biotechnology / Chemistry)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
HU101	1	Foundation English I	60	20	20	0	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

.Course Educational Objectives (CEOs): The students will be able to:

- Develop the second language learners' ability to enhance and demonstrate LSRW Skills.
- Enable students to acquire English Language Skills to further their studies at advanced levels.
- prepare students to become more confident and active participants in all aspects of their undergraduate programs

Course Outcomes (COs): The students should be able to:

- Enhance confidence in their ability to read, comprehend, organize, and retain written information.
- Write grammatically correct sentences for various forms of written communication to express oneself.

COURSE CONTENTS:

UNIT I

Communication: Nature, Meaning, Definition, Process, Functions and importance, Characteristics of Business Communication Verbal and Non Verbal Communication Barriers to Communication.

UNIT II

Listening: Process, Types, Difference between Hearing and Listening, Benefits of Effective Listening Barriers to Effective Listening, Overcoming Listening Barriers, and How to Become an Effective Listener

UNIT III

Basic Language Skills: Grammar and usage- Parts of Speech, Tenses, S-V Agreement, Preposition, Article, Types of Sentence, Direct - Indirect, Active - Passive voice, Phrases & Clauses.

UNIT IV

Business Correspondence : Business Letters, Parts & Layouts of Business Letter, Resume and Job application , Application Calling/ Sending Quotations/ Orders/ Complaints. E-mail writing

UNIT V

Précis Writing, Noting: The Purpose of Notes, Methods of Note-Taking, General Principles of Good Notes. Drafting: Notice, Agenda and Minutes. Advertisement: Importance, Types, Various Media of Advertising. Slogan Writing.

Practical:

- Self Introduction
- Reading Skills and Listening Skills
- Linguistics and Phonetics
- Role play
- Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations.

Suggested Readings

- Ashraf Rizvi.(200**5).***Effective Technical Communication*. New Delhi:Tata Mc Graw Hill
- A.J. Thomson and A.V. Martinet(1991).*A Practical English Grammar*(4th ed). Newyork: Ox- ford IBH Pub.
- Kratz, Abby Robinson (1995). Effective Listening Skills. Toronto: ON: Irwin Professional Publishing.
- Adair, John (2003). Effective Communication. London: Pan Macmillan Ltd.

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B.Sc. (Life Science / Biotechnology / Chemistry)

BSLS102 Cell Biology and Basic Microbiology

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSLS102	DC	Cell Biology & Basic Microbiology	60	20	20	30	20	4	1	2	7

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/ Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To give a comprehensive idea about the structural aspects of plant and animal cells and cellular organelles
2. To give a comprehensive idea about the important classes of microorganisms and their importance

Course Outcomes:

1. Student will be able to understand the structure and function of cell organelles, cell divisions and cell cycle
2. Student will be able to understand the salient features of microorganisms, their importance in nature and their control

A. Cell Biology

Unit-I

Discovery of cell and cell theory. Structure of prokaryotic and eukaryotic cells.Cell division and cell cycle. Cell synchrony and Cell signaling.

Structure and function of Cell wall and Plasma membrane. Diffusion and Osmosis; ion channels and ion pumps.

Unit - II

Structure and function of – Mitochondria and Chloroplast.

Nucleus and Nucleolus. Structure of chromosomes, Polytene and Lampbrush Chromosomes

Unit - III

Structure and function of - Endoplasmic reticulum, Golgiapparatus, Lysosomes, Ribosomes, Microtubule, Microfilaments and Intermediate filaments.

B. Basic Microbiology

Unit- IV

History of microbiology; Important discoveries in Microbiology; Structure of bacteria; Classification of microorganisms and major groups of bacteria; General characteristics of viruses

Unit – V

Nutritional classes of bacteria; Types of media and cultivation of bacteria; Factors affecting growth; Batch, continuous and synchronous culture;
Measurement of bacterial growth; Growth curve and phases of growth cycle; Generation time and growth rate
Control of microorganisms - Physical methods [temperature, filtration, radiation]; Chemical methods for disinfection and sanitation
Role of microorganisms in nitrogen carbon, sulphur and phosphorus cycle

BSLSL105 Practical:

1. Aseptic transfer techniques for microorganisms.

2. Morphological study of microorganisms by;
    a) Wet mount
    b) Monochrome staining
    c) Gram staining
    d) Spore staining
    e) Fungal staining

3. Preparation of liquid and solid media for culturing bacteria/fungi.

4. Isolation of bacteria from air/water/soil by Streak Plate Technique.

5. Techniques for enumeration of microorganisms:
    a) Pour plate method
    b) Spread plate method
    c) Cell count by Neubauer's Chamber
    d) Plaque Count
    e) Turbidometric method

6. Observation of motility of microorganisms by:
   a) Hanging drop technique
   b) Swarming growth

7. Growth curve of bacteriaand calculation of generation time.

8. Effect of UV light/pH/temperature/salt concentration on bacterial growth.

9. Observation of various stages of mitosis and meiosis

10. Identification of the cell membrane, nucleus and cytoplasm in an animal cell and the cell wall, cell membrane, sap vacuole, cytoplasm, nucleus and chloroplasts in a plant cell

11. Methods of cell lysis: osmotic/enzymatic/chemical.

12. Permanent slides of: Prokaryote, Eukaryote, Muscle, Nerve, Stomata.

Books:

1. Microbiology – Pelczar, Chan and Kreig.
2. Microbiology – an introduction – Tortora, G. J., Funkr, B. R. and Case C. L.
3. General Microbiology – Stainer R Y , Ingraham J L, Wheelis M L and Painter P R.
4. Biology of Microorganisms – Brock and Madigan.
5. Elementary Microbiology – H. A. Modi.
6. Text Book of Microbiology – Dubey and Maheshwari.
7. Microbiology – A practical approach – Patel and Phanse.
8. Microbiology – S. S. Purohit.
9. General Microbiology – Powar and Daginawala.
10. Cell Biology, Powar C.B. Himalaya Publishers, Students Edition.
11. Cell Biology, Rastogi, S.C., New Age International.
12. Essential Cell Biology by B. Alberts et al, Taylor & Francis Group.

BSCH103 Physical Chemistry-I

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SE	Two	Teacher	END SE	Teacher				
BSCH103	DC	Physical Chemistry-I	60	20	20	30	20	3	1	4	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

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Physical Chemistry- I

Course Objectives:-

To give basic knowledge of state of matter.

To understand and apply the knowledge of equilibria.

Course Outcomes:-

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of various state of matter.

CO2. Became aware of the importance of equilibria and its laws in the field of chemistry and dealing with its numerical approach.

Unit I: Gaseous state:

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η ; variation of viscosity with temperature and pressure.

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Behavior of real gases: Deviations from ideal gas behavior, compressibility factor, Z, and its variation with pressure for different gases. Causes of deviation from ideal behaviour. vander Waals equation of state, its derivation and application in explaining real gas behaviour.

Unit II: Liquid state:

Qualitative treatment of the structure of the liquid state; Radial distribution function; 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. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water.

Unit III: Solid state:

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals.

Unit IV: Ionic equilibria:

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri-protic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Unit V: Phase equilibria:

Definitions of phase, component and degrees of freedom. Phase rule and its derivations. Definition of phase diagram. Phase equilibria for one component system – water, CO2. First order phase transition and Clapeyron equation; Clausius-Clapeyron equation - derivation and use. Solid-liquid phase diagram. Eutectic

mixture.

Guidelines for Practical:

A two credit lab is to be conducted by covering the most relevant and useful topics from afore mentioned syllabus.

Recommended Texts:

1.Atkins, P.W. & Paula,J.de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
2.Ball, D. W. Physical Chemistry Thomson Press, India (2007).
3. Castellan, G. W. Physical Chemistry 4thEd. Narosa (2004).
4. Mortimer, R. G. Physical Chemistry3rd Ed. Elsevier: NOIDA, UP (2009).

BSBT104 Biochemistry and Instrumentation

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT104	DC	Biochemistry and Instrumentation	60	20	20	30	20	4	1	2	7

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To have the knowledge of chemical nature of important biomolecules
2. To know the principles of techniques and instruments used in biological laboratories

Course Outcome:

1. Students will be able to understand the chemical nature of biomolecules and their physical and chemical properties
2. Students will be familiar with the analytical techniques and the working principles of the instruments used in biological laboratories

A. Biochemistry

Unit-I
Structure, classification and function ofCarbohydrates and Lipids
Structure and types of DNA and RNA

Unit - II
Structure, classification and function of Amino acids and Proteins
Structure and function of vitamins

Unit-III
Enzymes – Classification**,** Energy of activation andEnzyme kinetics, Michaelis – Menten equation.

Cofactors and coenzymes; Isozyme, ribozyme and abzymes

Allosteric enzymes

B. Instrumentation

Unit - IV

Light Microscopy (bright field, dark field), Phase contrast and Fluorescence.
Electron Microscopy (SEM and TEM)

Spectroscopy: Beer Lambert's Law, Colorimeters, UV and Visible spectroscopy, Flame photometer.

Unit – V

Chromatography: Paper, Thin layer, Ion exchange, affinity and Gel filtration
Electrophoresis: Agarose gel, SDS PAGE and Native PAGE.
Centrifugation – Basic principles, preparative and analytical centrifuges
Radioactivity – autoradiography, Geiger counterand Scintillation Counter.

BSBTL106 Practical:

1. Qualitative and Quantitative [Nelson Somogyii's/DNS method] estimation of carbohydrates.
2. Qualitative and Quantitative [Folin Lowry's method] estimation of Proteins.
3. Determination of the enzyme activity by colorimetric methods
4. Effect of temperature on the activity of the given enzyme.
5. Effect of pH on the activity of the given enzyme
6. Effect of enzyme concentration on the activity of the given enzyme.
7. Effect of substrate concentration on the activity of the given enzyme and determination of V_{max} and K_m.
8. Determination of concentration of DNA by DPA method.
9. Determination of concentration of RNA byOrcinol method.
10. Separation of leaf pigments by paper chromatography.
11. Separation of aliphatic, aromatic and polar amino acids by TLC.
12. Isolation of biomolecules from natural sources.
13. Agarose gel electrophoresis of DNA/RNA sample.
14. Separation of proteins on the basis of size by SDS-PAGE.

Books:

1. Principles of Biochemistry. Lehniger, Nelson and Cox (Worth).
2. Biochemistry Stryer, W.H. Freeman.
3. Harper's Biochemistry, McGraw-Hill.
4. Zubey GL. Parson WW and Vance DE, Principles of Biochemistry – WM.C. Brown Publishers, Oxford, England
5. Fundamentals of Biochemistry, Jain, J.L..
6. Biochemical Methods of Analysis: *Theory and Applications*, SarojDua, S., Garg, N. Narosa Publishing House.
7. Biochemistry, Sharma, D.K. Narosa Publishing House
8. Experiments in Biotechnology – Nighojkar and Nighojkar