Shri VaishnavVidyapeethVishwavidyalaya, Indore

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

Course Code	Category	Course Name	THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
HU201	II	Foundation English II	60	20	20	0	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher's Assessment** shall be based upon 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:

- Participation in seminars, group discussions, paper presentation and general personal interaction sat the professional level.
- Have adequate mastery over communicative English, reading and writing skills, second aril listening and speaking skills.

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

- Improve their language skills, oral communication skills, group discussion skills, personal skills and confidence level.
- Express his /her ideas and thoughts in speech or writing,
- Bridge the language gap vital to their success.
- Communicate effectively.

COURSECONTENTS:

UNIT I

Communication: Objectives of Communication, Formal and Informal Channels of Communication, Advantages and Disadvantages, Extra personal communication, Interpersonal communication, Intrapersonal communication, Principles of communication.

UNIT II

Developing Reading Skills: Reading Comprehension, Process, Active & Passive reading, Reading speed Strategies, Benefits of effective reading, SQ3R Reading technique.

UNIT III

Vocabulary Building: Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon, Word Formation.

UNIT IV

Developing Writing Skills: Planning, Drafting and Editing, Developing Logical Paragraphs, Report Writing: Importance of Report, Characteristics of Good Report, Types of Report, Various Structures of a Report.

UNIT V

Professional Skills: Negotiation Skills, Telephonic Skills, Interview Skills: Team building Skills and Time management

Practical:

- Listening
- Linguistics and Phonetics
- Telephonic Conversation
- Mock Interviews
- Group discussions
- Extempore
- Debate
- Role Plays

Suggested Readings

- Ashraf Rizvi.(200**5).***EffectiveTechnical Communication*. New Delhi:TataMcGrawHill
- Prasad, H. M.(2001*) How to Prepare for Group Discussion and Interview*. New Delhi: Tata McGraw-Hill.
- Pease, Allan. (1998).*Body Language*. Delhi: Sudha Publications.
- Morgan, Dana (1998).*10 Minute Guide to Job Interviews*. New York: Macmillan.

Shri VaishnavVidyapeethVishwavidyalaya, Indore

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

BSLS 202 Ecology, Biodiversity and Evolution

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*				
BSLS 202	DC	Ecology, Biodiversity and Evolution	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 Objective:

1. To give a comprehensive idea of origin and diversity of plants and animals
2. To give a comprehensive idea of ecological principle, natural environment and environmental pollution

Course Outcome:

1. Student will have the knowledge of evolution and diversity of plants and animals
2. Student will have the knowledge of ecological principles and natural environment
3. Student will be able to understand problems related to biological conservation and prevention of environmental pollution

A. Ecology

Unit - I

Ecosystem Concept and Structure; Trophic Levels – Producers, Consumers, Decomposers;
Ecological Pyramids; Pyramids of Number, Biomass and Energy
Energy Flow in Ecosystem; Food Chains and Food Web
Biotic and Abiotic Factors of Ecosystem; Positive and Negative Biotic interactions

Unit – II

Ecological adaptations of hydrophytes, xerophytes and halophytes
Ecological succession: Primary and Secondary Succession; Hydrarch and Xerach Succession.
Biogeochemical cycles: Nitrogen, Carbon, Sulphur and Phosphorus cycles.

Unit – III

Air Pollution; Climate Change; Green House Gases and Global Warming; Acid Rain; Ozone Depletion and Solar UV

Water Pollution; BOD; COD; Pollution by Heavy Metals, Pesticides; Waste water treatment

Solid Waste; Domestic, Hospital and Industrial

B. Biodiversity and Evolution

Unit – IV

Theories of Organic evolution: Lamarckism and Neo Lamarckism, Darwinism and Neo Darwinism, Germplasm theory, Mutation theory.
Origin of prokaryotic and eukaryotic cell; Gaia Hypothesis
Gene pool, Random genetic drift, Hardy Weinberg law
Isolation - types and mechanisms; Speciation

Unit – V
Plant Diversity: Major groups and salient features of Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms
Animal Diversity: Major groups and salient features of Invertebrates and Vertebrates

BSLSL205Practical:

1. Determination of frequency, density and abundance of vegetation by quadrate method.
2. Soil analysis (pH, temperature, moisture, inorganic content and bacterial count).
3. Isolation of symbiotic and non-symbiotc nitrogen fixing bacteria and actinimycetes from soil.
4. Determination of total organic component (TOC) in soil sample.
5. Biotic components of pond.
6. Water analysis (pH, DO, carbon dioxide and number of bacteria).
7. Determination of total dissolved solids (TDS) in water.
8. Determination of DO, BOD and COD of polluted and unpolluted water.
9. Analysis of drinking water by MTT and MFT.
10. Detection of fecal pollution of water by performing presumptive test, confirmed test and completed test.

11. Determination of MPN n coliforms in water.
12. Bioremediation of waste water and its toxicity check.
13. Characterization of waste water:
    a. Physical; odor, color, turbidity, temperature, salinity
    b. Chemical: acidity, alkalinity, sulphate, copper
14. Estimation of alkaline and acid phosphatase activity of soil
15. Microbiological quality analysis of air.
16. Specimens / Slidesof Plant diversity.
17. Specimens / Slidesof Animal diversity.

Books:

1. Environmental Science: *A New Approach* .Dahiya, P.andAhlawat, M. Narosa Publishers.
2. Ecology - Subrahmanyam, N.S. and Sambamurty, A. V. S. S. Narosa Publishing House.
3. Concepts of Ecology – Kormondy, E. J. Prentice Hall, USA, $th Edition.
4. Ecology and Environment – Sharma P. D. Rastogi Publication, Meerur, India.
5. Biology – Raven P.H., Johnson G.B., Losos J.B. and Singer S.R. Tata McGraw Hill, Delhi, India.

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

BSCH203 PHYSICAL CHEMISTRY-II

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			ENDSEM	Two	Teache	ENDSEM	Teache				
BSCH203	DC	PHYSICAL CHEMISTRY-II	60	20	20	30	20	3	1	4	6

Legends: L - Lecture; T – Tutorial / Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/ Assignment / Attendance, MST MidSem Test.

***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participationin Class, given that no component shall exceed more than 10 mark**

COURSE OBJECTIVE:

1. To develop the understanding of fundamentals of Thermodynamics & itsapplications.
2. To give basic knowledge of Chemical equilibrium andSolution.

COURSE OUTCOMES

After completion of the course the students are expected to be able to demonstratefollowing knowledge, skills and attitude. The students demonstrate capability of understanding : Theoretical understanding of fundamentals of Thermodynamics &itsapplications.

Become aware of fundamentals of Chemical equilibrium and Solution.

SYLLABUS:

Unit-I: Chemical Thermodynamics- I :

Intensive and extensive variables; state and path functions; isolated, closed and open systems. First law: Concept of heat, Q, work, W, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of Q, W, ΔU and ΔH for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. Thermochemistry: Heats of reactions: standard states; enthalpy of formation and enthalpy of combustion and its applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions. Second Law:Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics. Calculation of entropy change for reversible and irreversibleprocesses.

Unit-II: Chemical Thermodynamics- II :

Third Law: Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules. Free Energy Functions: Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule- Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state. Systems of Variable Composition: Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

Unit-III:Thermodynamic Equilibrium:

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration (LeChatelier Principle, Quantitatively)). Free energy of mixing and spontaneity. equilibrium between ideal gases and a pure condensedphase.

Unit-IV: Solutions and Colligative Properties-I:

Ideal solution-Thermodynamics of Ideal solutions; Raoult's Law- derivation of Raoult's Law; NonIdealor real solutions; activity and activity coeifficent; colligatives properties: (i) relative lowering of vapour pressure- determinaton of molecular weight; osmotic pressure- osmosis, measurment of osmotic pressure, Law of osmotic pressure and determinatonof molecular weight.

Unit-V: Solutions and Colligative Properties-II:

Elevation in boiling point: Thermodynamic derivation of relation between molecular weight and elevation in boiling point, determinaton of molecular weight.
Depression of freezing point: Thermodynamic derivation of relation between molecular weight and depression of freezing point, determinaton of molecular weight.
Abnormal molarmass- Degree of dissositation and degree of association; Van't Hoff factor (i).

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

Reference Books:

1. Peter, A. & Paula, J. de. Physical Chemistry 9th Ed., Oxford University Press(2011).
2. Castellan, G. W. Physical Chemistry 4th Ed., Narosa(2004).
3. Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall(2012).
4. McQuarrie, D. A. & Simon, J. D. Molecular Thermodynamics Viva Books Pvt. Ltd.:New Delhi(2004).

BSBT 204: Genetics and Molecular Biology

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*				
BSBT 204	DC	Genetics and Molecular Biology	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 principles of genetics
2. To have the knowledge of molecular biology and the role of macromolecules in transfer of genetic information

Course Outcomes:

1. Student will be able to understand the classical experiments of genetics that laid the foundations of genetic principles
2. Student will be able to understand the molecular nature of genes and techniques of transferring genes

A. Genetics

Unit – I

Mendelian Laws of genetics, Dominance, Segregation, Independent Assortment; Epistasis, Complementary ratio and supplementary ratio, Cytoplasmic inheritance; plastid and kappa particles.

Linkage and crossing over (Coupling and repulsion hypothesis) Mechanism of crossing over and its significance.

Mechanism of sex determination (Chromosomal theory), sex linked inheritance.

Unit-II

Structural and numerical chromosomal aberrations.

Chromosome related disorders: Kleinfelter's syndrome, Turner's syndrome, Down's syndrome and Cri-du-chat syndrome

Mutations- Spontaneous and induced, Chemical and physical mutagens

Molecular basis of mutation.

B. Molecular Biology

Unit-III

Transformation, Conjugation and transduction in bacteria; Gene mapping in bacteria; Prokaryotic and eukaryotic DNA replication and Transcription, Processing of m-RNA, Splicing, DNA and RNA polymerases

Prokaryotic and Eukaryotic Translation - Mechanism of initiation, elongation and termination. Gene regulation in eukaryotic system – Promoters, enhancers elements and gene amplification.

Unit-IV

Genetic engineering: Isolation of genomic and plasmid DNA from bacteria, Isolation of genomic DNA from plant and animal cells.

Recombinant DNA technology – cloning vectors (pUC 19, phage λ, cosmid and M13); Restriction enzymes, introduction of DNA into living cells, methods of gene transfer, expression and detection of clones.

Unit – V

Introduction to Principles and applications of blotting technique: Western , Southern and Northern Blots and Polymerase Chain Reaction.

BSBTL 206Practical:

1. Isolation of DNA from bacterial cell
2. Isolation of DNA from plant cell
3. Isolation of DNA from animal cell
4. Isolation of plasmid DNA from bacteria and determination of its molecular weight by agarose gel method
5. Isolation of RNA from bacterial cell
6. Analysis of DNA by gel electrophoresis
7. UV as a physical mutagen
8. Genetic transformation of *E.coli*with standard plasmids and calculation of transformation efficiency
9. Development of antibiotic resistant bacterial starins using conjugation
10. Restriction digestion of DNA and agarose gel electrophoresis of fragments
11. Ligation of cleaved DNA fragments by using ligase enzyme
12. Artificial transformation of bacterial cells
13. Blue-white screening of recombinants
14. Amplification of β-galactosidase gene in *E.coli*using PCR
15. RFLP and DNA finger printing
16. Steps in cloning using GPF (Green Fluorescent Protein) gene
17. Southern Blotting

Books

1. Lewin, B., Genes VII, Oxford University Press.
2. Strickberger M, W. [2002], Genetics – Prentice Hall, India.
3. Brown T. A., Genetics; a molecular approach – Chapman & Hall, London.
4. Friefelder, D., Molecular Biology, Jones &Barltlett Publishers.