



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

### SEMESTER II



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore  
Shri Vaishnav Institute of Social Sciences, Humanities and Arts  
Choice Based Credit System (CBCS) in Light of NEP-2020  
Humanities (Common Course)  
Semester II (Batch 2021-24)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
HU201	AECC	Foundation English II	60	20	20	-	50	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

- CEO1 Understand the role and types of workplace communication
- CEO2 Read their texts for understanding for pleasure and business purpose.
- CEO3 Understand language, word relationships and nuances in word meanings.
- CEO4 Recall key elements of structure and style in drafting technical reports
- CEO5 Develop competency in professional communication.

#### Course Outcomes (COs): The students will be able to

- CO1 Discuss the role and types of workplace communication
- CO2 Practice reading based on comprehension of a text.
- CO3 Use resources to increase vocabulary and gain deeper understanding by using context of words and sentences.
- CO4 Write according to standard principles of structure, style, and English-language mechanics.
- CO5 Demonstrate different strategies for using professional communication skills.

#### Paper I

#### HU201

#### Foundation English II

#### COURSE CONTENTS

#### 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.

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**HU201 Foundation English II**

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#### 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

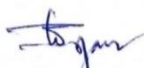
Professional Skills: Negotiation Skills, Telephonic Skills, Interview Skills: Team building Skills and Time management


#### Practical:

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

  
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**SEMESTER II**

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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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HU201	AECC	Foundation English II	60	20	20	-	50	3	0	2	4


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


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**Suggested Readings**

1. Ashraf Rizvi.(2005). *Effective Technical Communication*. New Delhi: Tata McGraw Hill
2. Prasad, H. M.(2001) *How to Prepare for Group Discussion and Interview*. New Delhi: Tata McGraw-Hill.
3. Pease, Allan. (1998). *Body Language*. Delhi: Sudha Publications.
4. Morgan, Dana (1998). *10 Minute Guide to Job Interviews*. New York: Macmillan.

  
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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSLS202	DC	Ecology, Biodiversity and Evolution	60	20	20	30	20	4	1	2	7

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#### 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 Xerarch 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.

  
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**BSLS 202 Ecology, Biodiversity and Evolution**

**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.

**BSLSL205 Practical:**

1. Determination of frequency, density and abundance of vegetation by quadrat method.
2. Soil analysis (pH, temperature, moisture, inorganic content and bacterial count).
3. Isolation of symbiotic and non-symbiotic nitrogen fixing bacteria and actinomycetes 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 and 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 / Slides of Plant diversity.
17. Specimens / Slides of Animal diversity.

  
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**BSLS 202 Ecology, Biodiversity and Evolution**

**Books:**

1. Environmental Science: *A New Approach* .Dahiya, P.and Ahlawat, 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, 5th 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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## SEMESTER II

SUBJECT CODE	Categ ory	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			ENDSEM University Exam	Two Term Exam	Teachers Assessment*	ENDSEM University Exam	Teachers Assessment*				
BSCH203	DC	Physical Chemistry II	60	20	20	30	20	4	0	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/ Participation in Class, given that no component shall exceed more than 10 mark**

### Course Objective:

1. To develop the understanding of fundamentals of Thermodynamics & its applications.
2. To give basic knowledge of Chemical equilibrium and Solution.

### Course Outcomes:


After completion of the course the students are expected to be able to demonstrate following knowledge, skills and attitude. The students demonstrate capability of understanding : Theoretical understanding of fundamentals of Thermodynamics & its applications. Become aware of fundamentals of Chemical equilibrium and Solution.


### 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,  $\Delta U$  and  $\Delta H$  for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. Thermo chemistry: 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 irreversible processes.

### 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

  
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#### BSCH203 Physical Chemistry-II

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 condensed phase.

#### UNIT-IV: Solutions and Colligative Properties-I:

Ideal solution-Thermodynamics of Ideal solutions; Raoult's Law- derivation of Raoult's Law; NonIdeal or real solutions; activity and activity coefficient; colligative properties: (i) relative lowering of vapour pressure- determination of molecular weight; osmotic pressure- osmosis, measurement of osmotic pressure, Law of osmotic pressure and determination of 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, determination of molecular weight.  
Depression of freezing point: Thermodynamic derivation of relation between molecular weight and depression of freezing point, determination of molecular weight.  
Abnormal molar mass- Degree of dissociations 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).

  
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BSBT204	DC	Genetics and Molecular Biology	60	20	20	30	20	4	1	2	7

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#### 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: Klinefelter'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.

  
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**BSBT 204: Genetics and Molecular Biology**

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  $\lambda$ , 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 206 Practical:**

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 strains 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  $\beta$ -galactosidase gene in *E.coli* using PCR
15. RFLP and DNA finger printing
16. Steps in cloning using GFP (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 & Bartlett Publishers.

  
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