



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

ML301 ENVIRONMENT AND ENERGY STUDIES

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		L	T	P	CREDITS
		END SEM University Exam		Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
ML301	Environment and Energy Studies	60	20	20	-	-	4	-	-	4

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

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

Course Objectives

The objective of the course is to provide the contemporary issues in the Business Environment and to facilitate a better-informed Economic System

Course Outcomes

1. Understand the various environment, culture and society.
2. To know the differences between the business and Government.
3. Contextualize the concepts of public sector in India.

COURSE CONTENTS

Unit I: Environmental Pollution and Control Technologies:

1. Environmental Pollution & Control: Classification of pollution
2. Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards.
3. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil.
4. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management.
5. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

Unit II: Natural Resources:

1. Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts
2. Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
3. Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies



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Unit III: Ecosystems:

1. Definition, Scope and Importance ecosystem.
2. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids.
3. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visit

Unit IV: Biodiversity and its Conservation:

1. Introduction - Definition: genetic, species and ecosystem diversity.
2. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man/wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National biodiversity act.

Unit V: Environmental Policy, Legislation & EIA:

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP)

Suggested Readings

1. Agarwal, K.C.,(latest edition).Environmental Biology, Bikaner :Nidi Pub. Ltd.,
2. Brunner R.C.(latest edition) Hazardous Waste Incineration, McGraw Hill Inc.
3. Clank R.S. ,(latest edition. Marine Pollution, Clarendon Press Oxford (TB).
4. Environmental Encyclopedia, Jaico Pub. Mumbai,
5. De A.K(latest edition) Environmental Chemistry, Wiley Western Ltd.
6. ErachBharucha(2005).Environmental Studies for Undergraduate Courses by for University Grants Commission.
7. R. Rajagopalan(2006).Environmental Studies. Oxford University Press.
8. M. AnjiReddy(2006).Textbook of Environmental Sciences and Technology. BS Publication.
9. Richard T. Wright(2008).Environmental Science: towards a sustainable future PHL Learning Private Ltd. New Delhi.
10. Gilbert M. Masters and Wendell P. Ela .(2008).Environmental Engineering and science. PHI Learning Pvt Ltd.
11. Daniel B. Botkin& Edwards A. Keller(2008).Environmental Science Wiley INDIA edition.
12. AnubhaKaushik(2009).Environmental Studies. New age international publishers.



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BSLS302: Morphology, Physiology and Developmental Biology of Angiosperms

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*				
BSLS302	DC	Morphology, Physiology and Developmental Biology of Angiosperms	60	20	20	30	20	4	1	2	7

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

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Course Objectives:

1. To study the morphology and physiology of higher plants
2. To study the stages of development in higher plants

Course Outcomes:

1. Student will be able to understand the structural and functional aspects of higher plants
2. Student will be able to understand the various stages of development in higher plants

Unit-I

The Root system: Root apex and Anatomy of root in monocotyledons and dicotyledons.
The Shoot system: Shoot apex and Anatomy of shoot in monocotyledons and dicotyledons.
Phyllotaxy and Anatomy of leaf in monocotyledons and dicotyledons.

Unit-II

Morphology of flower. Microsporogenesis and Megasporogenesis,
Pollination and Fertilization.
Development of embryo and endosperm in dicotyledons and monocotyledons.

Unit-III

Properties of water, water potential, absorption and transport. Transpiration and mechanism of stomata. Soil-plant-atmosphere continuum.
Drought, heat stress, salinity stress and chilling.



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Unit-IV

Photosynthesis: pigments, antenna and reaction centers. Primary light reactions, electron transport chain and phosphorylation. Calvin cycle and carbon fixation in C₃, C₄ and CAM plants.

Respiration: Glycolysis, TCA cycle and oxidative phosphorylation in Mitochondria.

Unit-V

Plant growth and photomorphogenesis. Phytochrome structure and function. Photoperiodism, Physiology of flowering and vernalization.

Plant movements, autonomic and Paratonic movements.

BSLSL305 Practical:

- 1) Histological study of roots of Monocots and Dicots
- 2) Histological study of Monocot and dicot stem
- 3) Morphology of monocot and dicot leaves
- 4) Floral organs, floral formula and floral diagram
- 5) Morphology of pollen grains
- 6) Morphology of ovary and placenta
- 7) Parts of Seed, embryo and endosperm
- 8) Plasmolysis and de-plasmolysis
- 9) Differential permeability
- 10) Isolation and absorption spectra of chlorophyll and carotenoids
- 11) Separation of chlorophyll and carotenoids by paper chromatography
- 12) Isolation of chloroplasts and demonstration of Hill activity
- 13) Scotomorphogenesis and photomorphogenesis
- 14) Gravitropic and phototropic movement

Books:

1. Embryology of Angiosperms- Bhojwani, S.S. and Bhatnagar, S.P.
2. An Introduction to Embryology of Angiosperms- Maheshwari, P., McGraw Hill Inc., N.Y.
3. Anatomy- Singh V., Pandey P.C. and Jain, D.K.
4. Modern Plant Physiology- Sinha, R.K. Narosa Publishing House.
5. Textbook of Plant Physiology - Verma V., Ane books Publishers.
6. An Introduction to Plant Anatomy-B.P. Pandey, S.Chand Publications.



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BSBT303: Metabolism and Genetic Engineering

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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*					
BSBT303	DC	Metabolism and Genetic Engineering	60	20	20	30	20	4	1	2	7	

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

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Course Objectives:

1. To understand the biochemistry of primary and secondary metabolism
2. To understand the principles of genetic engineering

Course Outcomes:

1. Student will have the knowledge of synthesis and degradation of biomolecules
2. Students will be able to understand the application part of molecular biology

Unit – I

Carbohydrate metabolism – aerobic and anaerobic glycolysis. Gluconeogenesis. Pentose phosphate pathway.

Lipid metabolism – synthesis and degradation of fatty acids.

Unit – II

Nitrogen metabolism: Biological nitrogen fixation. Nitrate reduction and its regulation, Ammonia assimilation.

Biosynthesis of amino acids. Oxidation of amino acids and production of urea.

Unit III

Protein synthesis. Protein targeting and degradation.

Biosynthesis and degradation of nucleotides.



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Unit-IV

Principles and applications: Maxam Gilbert's and Sanger's DideoxyDNA Sequencing techniques, Next Generation Sequencing, Gene Therapy, DNA microarray

Unit – V

Production and applications of transgenic plants, animals and microbes.

Genetic engineering and human diseases.

Biosafety guidelines and ethical issues of genetic engineering

BSBTL306 Practical:

1. Extraction and estimation of carbohydrates
2. Extraction and estimation of lipids
3. Extraction and estimation of proteins
4. Gel electrophoresis of proteins
5. Extraction of DNA from plant cells
6. Extraction of DNA from animal cells
7. Genomic DNA isolation from microorganisms
8. Spectrophotometric analysis of DNA
9. Analysis of DNA by Agarose gel electrophoresis
10. Extraction of RNA from plant cells
11. Extraction of RNA from animal cells
12. Extraction of RNA from microorganisms

Books:

1. Gene IX – Lewin B, Jones and Barlett Publishers.
2. Molecular Biology of the gene, Watson et al, Benjamin Cummings Publishing Company Inc.
3. Molecular Biology of the cell, Garland.
4. Molecular Biotechnology, Glick BR and Pasternak JJ, ASM Press.
5. Molecular Cell Biology, Lodish et al.
6. Gene Cloning, Brown TA.



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BSCH304	DC	Inorganic Chemistry I	60	20	20	30	20	3	1	6	8

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

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

Unit – 1

I. Atomic Structure:

Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of ψ and ψ^2 , quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d, orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configurations of the elements, effective nuclear charge.

II. Periodic Properties:

Detailed discussion of the following properties with examples

- Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.
- Atomic radii (van der Waals)
- Ionic and crystal radii.
- Covalent radii (octahedral and tetrahedral)
- Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.
- Electron gain enthalpy, trends of electron gain enthalpy.
- Electronegativity.

Unit-2

Chemical Bonding:

(A) Covalent Bond – Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory to NH_3 , SF_4 , ICl_2 and H_2O , MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro-negativity difference.



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(B) Ionic Solids – Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, lattice energy and polarizing power and polarisability of ions, Fajan's rule.

(C) Weak Interactions – Hydrogen bonding, Vander Waals forces.

Unit- 3

Chemistry of *s* and *p* block elements:

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation.

Hydrides and their classification ionic, covalent and interstitial.

Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses.

Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes, silanes, Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds pseudohalogen and basic properties of halogens.

UNIT-4

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.

UNIT-5

Hard and Soft Acids and Bases (HSAB)

Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity and hardness and softness.

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. Huheey, J.E. *Inorganic Chemistry*, Prentice Hall
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford
3. Lee, J.D. *Concise Inorganic Chemistry*, ELBS
4. Shriver & Atkins, *Inorganic Chemistry*, Third Edition, Oxford Press
5. H.W. Porterfield, *Inorganic Chemistry*, Second Edition, Academic Press,
6. Canham, G.R. and Overton, T., *Descriptive Inorganic Chemistry*, Freeman & Co.
7. Cotton, F.A. and Wilkinson, G., *Advanced Inorganic Chemistry*, Wiley, VCH.
8. Lippard, S.J. & Berg, J.M. *Principles of Bioinorganic Chemistry* Panima Publishing Company



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Practicals:

1. Calibration and use of apparatus.
2. Preparation of solutions of different Molarity/Normality.
3. Identification of cations and simple anions in a mixture of salts containing not more than six ions (Three cations and three anions).
4. Estimation of Fe (II) and oxalic acid using standardized KMnO_4 solution.
5. Estimation of available chlorine in bleaching powder iodometrically.
6. Inorganic Preparations
 - (i) Tetraammine copper (II) sulphate, $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 \cdot \text{H}_2\text{O}$,
 - (ii) Potassium trisoxalatochromate (III), $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$,
 - (iii) Cis and trans $\text{K}[\text{Cr}(\text{C}_2\text{O}_4)_2 \text{H}_2\text{O}_2]$ Potassium dioxalato diaquachromate(III),
 - (iv) Pentaamminecarbonato Cobalt (III) ion.