

SYLLABUS

B.Sc. (Honours) - Biochemistry (1st Semester)

Three/Four Years Undergraduate Degree Course [CBCS Semester Mode]

[As per the "Guidelines for Multiple Entry and Exit in Academic Programmes offered in Higher Education Institutions" issued by UGC New Delhi under NEP 2020]

Session: 2022-26

**SCHOOL OF STUDIES IN BIOCHEMISTRY
JIWAJI UNIVERSITY
GWALIOR - 474 011 (MP)**

Dr. Jyoti
Dr. Jyoti
Dr. Jyoti

Jiwaji University, Gwalior
B.Sc. (Hons) Biochemistry 2022-26

Course Structure and Scheme of Examination

FIRST SEMESTER (Examination Dec 2022)

Course Code	Course Name	Total Marks	Credit	End Sem Exam Marks		Sessional Marks	
				MAX	MIN	MAX	MIN
BCH CC-I-T (Major Course)	Biomolecules (Theory)	100	4	60	21	40	14
BCH CC-II-T (Minor Course)	Cell Biology (Theory)	100	4	60	21	40	14
BCH CC-I-P (Major Course)	Biomolecules-Lab	100	2	60	21	40	14
BCH CC-II-P (Minor Course)	Cell Biology-Lab	100	2	60	21	40	14
GE-I-T	Zoology-I (Theory) (Perspectives in Ecology)	100	4	60	21	40	14
AECC-I-T	English Communication (Theory)	100	4	60	21	40	14
	Grand Total		20				

M. J. J. J.

Dr. V. K. B. B.

B.Sc. [Honors] Biochemistry [CBCS Structure]

Major Core & Minor Courses (BCH CC – I & II)

Generic Electives Course (GE – I)

Ability Enhancement Compulsory Course – I (AECC – I)

BCH CC – I (Major Course): Biomolecules (Theory)

BCH CC – II (Minor Course): Cell Biology (Theory)

BCH CC – IP (Major Course): Biomolecules (Practical)

BCH CC – IIP (Minor Course): Cell Biology (Practical)

GE – I - T - Zoology – I Perspectives in Ecology (Theory)

AECC – I – T: English Communication (Theory)

Ms. Jaimal

Prof. V. S. Srinivasan

Major Core Course (Theory)

BCH CC-I (Major Course): Biomolecules (Theory)

Total Hrs: 60

Credit: 4

UNIT-I The foundations of biochemistry

1. Cellular and chemical foundations of life
2. Water: Unique properties, weak interactions in aqueous systems, ionization of water, buffers, water as a reactant and fitness of the aqueous environment.

UNIT-II Carbohydrates and glycobiology

1. Monosaccharides - structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers, structure of biologically important sugar derivatives, oxidation of sugars.
2. Formation of disaccharides, reducing and nonreducing disaccharides.
3. Polysaccharides – homo- and heteropolysaccharides, structural and storage polysaccharides. Structure and role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides).

UNIT-III Lipids

1. Building blocks of lipids – Definition, Classification and structure.
2. Storage lipids - triacyl glycerol and waxes.
3. Structural lipids in membranes – glycerophospholipids, galactolipids and sulpholipids, sphingolipids and sterols,
4. Structure, distribution and role of membrane lipids. Plant steroids.
5. Specialized functions of lipids: Lipids as signals, cofactors and pigments

UNIT-IV Amino acids and Proteins

1. Structure and classification, physical, chemical and optical properties of amino acids
2. Non-protein amino acids. Physical and chemical properties of amino acids. Titration of amino acids, separation
3. Peptide Bonds: Rigid and planar nature of the peptide bond. Structure and function of some naturally occurring polypeptides.
4. Proteins: Structural levels Primary, Secondary, Super Secondary, Tertiary and Quaternary structures. Determination of primary structure of

UNIT-V Nucleic acids

1. Nucleotides - structure and properties.
2. Nucleic acid structure – Watson - Crick Model of DNA.
3. Structure of major species of RNA - mRNA, tRNA and rRNA.
4. Nucleic acid chemistry - UV absorption, effect of acid and alkali on DNA. Other functions of nucleotides - source of energy, component of coenzymes, second messengers.
5. Vitamins- Structure and active forms of water soluble and fat soluble vitamins, deficiency diseases and symptoms, hypervitaminosis

Chyavanmal

Qw

ratishivankar

Major Core Course (Practical)

BCH CC-IP (Major Course): Biomolecules (Practical)

Total Hrs: 30

Credit: 2

1. Safety measures in laboratories.
2. Preparation of normal and molar solutions.
3. Preparation of buffers.
4. Determination of pKa of acetic acid and glycine.
5. Qualitative tests for carbohydrates, lipids, amino acids, proteins and nucleic acids.
6. Separation of amino acids/ sugars/ bases by paper chromatography.
7. Estimation of vitamin C.

Suggested Readings:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414-8.
2. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New York), ISBN: 978-0-470-28173-4.
3. Harper's illustrated biochemistry (2018) 30th ed., Botham K, Mayes P, Murray RK, Granner DK. McGraw-Hill Companies New York, ISBN 0-07-138901-6/ ISSN 1043-9811
4. Biochemistry (2011) 4th ed., Voet D & Voet JG, John Wiley & Sons Inc., Singapore, ISBN: 978-0-470-91410-6

Ms. Jarmal

[Signature]

Ms. Divyanshu

Minor Core Course (Theory)

BCH CC-II (Minor Course): Cell Biology (Theory)

Total Hrs: 60

Credit: 4

UNIT-I Introduction to cell biology

1. Prokaryotic (archaea and eubacteria) and eukaryotic cell (animal and plant cells), cells as experimental models.
2. Tools of cell biology: Light microscopy, phase contrast microscopy, fluorescence microscopy, confocal microscopy, electron microscopy, FACS. Centrifugation for subcellular fractionation.

UNIT-II Structure of different cell organelles

1. Cell wall and extracellular matrix: Prokaryotic and eukaryotic cell wall, cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherence junctions, tight junctions, gap junctions, desmosomes, hemidesmosomes, focal adhesions and plasmodesmata.
2. Structure of nuclear envelope, nuclear pore complex. ER structure. Organization of Golgi. Lysosome.
3. Structure and functions of mitochondria, chloroplasts and peroxisomes.

UNIT-III Protein trafficking

1. Selective transport of proteins to and from the nucleus. Regulation of nuclear protein import and export.
2. Targeting proteins to ER, smooth ER and lipid synthesis. Export of proteins and lipids from ER and into ER.
3. Lipid and polysaccharide metabolism in Golgi. Protein sorting and export from Golgi. Mechanism of vesicular transport, cargo selection, coat proteins and vesicle budding, vesicle fusion. Protein import and mitochondrial assembly, protein export from mitochondrial matrix.
4. Import and sorting of chloroplast proteins.

UNIT-IV Cytoskeletal proteins

1. Structure and organization of actin filaments. Microfilament polymerization, organization of actin filaments. Non-muscle myosin.
2. Intermediate filament proteins, assembly and intracellular organization. Assembly, organization and movement of cilia and flagella.

UNIT-V Cell cycle, cell death and cell renewal

1. Eukaryotic cell cycle, restriction point, and checkpoints.
2. Cell division
3. Apoptosis and necrosis - brief outline

M. J. J. J.

(Signature)

Dr. Divyanshu

Minor Core Course (Practical)

BCH CC-IIP (Minor Course): Cell Biology (Practical)

Total Hrs: 30

Credit: 2

1. Visualization of animal and plant cell by methylene blue.
2. Identification of different stages of mitosis in onion root tip.
3. Identification of different stages of meiosis in grasshopper testis.
4. Micrographs of different cell components (dry lab).
5. Sub-cellular fractionation.
6. Visualization of nuclear fraction by acetocarmine stain.
7. Staining and visualization of mitochondria by Janus green stain.

Suggested Readings:

1. The Cell: A Molecular Approach (2009) 5th ed., Cooper, G.M. and Hausman, R.E., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN: 978-0-87893-300-6.
2. Molecular Cell Biology (2012) 7th ed., Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J., W.H. Freeman & Company (New York), ISBN:13: 978- 1-4641-0981-2 / ISBN:10: 1-4641-0981-8.
3. Molecular Biology of the Cell (2015) 6th ed., Alberts, B., Johnson, A., Lewis, J., and Enlarge, M., Garland Science (Princeton), ISBN: 0-8153-1619-4 / ISBN:0-8153-1620-8.

M. Jamal

Co

Vali Divanlar

B.Sc. [Honors] Biochemistry [CBCS Structure]

Generic Electives Course (GE – I) Theory

Zoology – I Perspectives in Ecology (Theory)
(Theory Course is offered by SOS in Zoology)

M. J. J. J.

200
valine Sivaraman

Generic Elective – I (Theory)

Zoology – I Perspectives in Ecology (Theory) (Theory Course is offered by SOS in Zoology)

Total Hrs: 60

Credit: 4

Unit I: Introduction to Ecology

1. History of ecology.
2. Autecology and synecology.
3. Levels of organization, Laws of limiting factors.
4. Study of physical factors.

Unit II: Population

1. Unique and group attributes of population: Density, natality, mortality, lifetables, fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion.
2. Exponential and logistic growth of population, equation and patterns, r and K strategies
3. Population interactions, Gause's Principle with laboratory and field examples.
4. Lotka-Volterra equation for competition and Predation, functional and numerical responses.

Unit III: Community

1. Community characteristics: species richness, dominance, diversity, abundance and vertical stratification.
2. Ecotone and edge effect.
3. Ecological succession with one example.

Unit IV: Ecosystem

1. Basic concept: Types of ecosystems with one example.
2. Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains.
3. Food web, Energy flow through the ecosystem.
4. Ecological pyramids and Ecological efficiencies.

Unit V: Applied Ecology

1. Ecology in Wildlife Conservation and Management.
2. Act and Legislation of wildlife conservation.
3. Nutrient and biogeochemical cycle with on example of Nitrogen cycle.
4. Zoo-geographical region of wildlife distribution.

Suggested Readings:

1. Colinvaux, P.A. (1993): Ecology, 2nd Ed., Wiley, John & Sons, Inc

Journal

CP
velu simran

2. Krebs, C.J. (2001): Ecology, 6th Ed., Benjamin Cummings
3. Odum, E.P. (2008): Fundamentals of Ecology, Indian Edition, Brooks/Cole
4. Robert Leo Smith, Ecology & Field Biology, Harper & Row Publisher
5. Ricklefs, R.E. (2000): Ecology, 5th Ed., Chiron Press
6. Chanda S. K. (1992): Conserving wildlife in India.

Original

Prof.
 Neelam K. Verma

B.Sc. [Honors] Biochemistry [CBCS Structure]

**Ability Enhancement Compulsory Course – I
[AECC-I]**

AECC-I English Communication (Theory Course)

M. J. J. J.

(10)

valius kirallos

AECC-I

English Communication (Theory Course)

Total Hrs: 60

Credit: 4

Unit – I: Introduction

1. Theory of Communication
2. Types and modes of Communication

Unit – II: Language of Communication

1. Verbal and Non-verbal (Spoken and Written),
2. Personal, Social and Business
3. Barriers and Strategies
4. Intra-personal, Inter-personal and Group communication

Unit – III: Speaking Skills

1. Monologue
2. Dialogue
3. Group Discussion
4. Effective Communication/ Mis- Communication
5. Interview
6. Public Speech

Unit – IV: Reading and Understanding

1. Close Reading
2. Comprehension
3. Summary Paraphrasing
4. Analysis and Interpretation
5. Translation (from Indian language to English and vice-versa)
6. Literary/Knowledge Texts

Unit – V: Writing Skills

1. Documenting
2. Report Writing
3. Making notes
4. Letter writing

Suggested Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brati Biswas

Chyarnal
As
Relu, Divyanka

SYLLABUS

B.Sc. (Honours) - Biochemistry **(2nd Semester)**

Three/Four Years Undergraduate Degree Course [CBCS Semester Mode]

[As per the “Guidelines for Multiple Entry and Exit in Academic Programmes offered in Higher Education Institutions” issued by UGC New Delhi under NEP 2020]

Session: 2022-26

SCHOOL OF STUDIES IN BIOCHEMISTRY
JIWAJI UNIVERSITY
GWALIOR - 474 011 (MP)

M. J. Jammal

Dr. N. S. Bivolaru

Jiwaji University, Gwalior
B.Sc. (Honours) Biochemistry 2022-26

Course Structure and Scheme of Examination

SECOND SEMESTER (Examination: June 2023)

Course Code	Course Name	Total Marks	Credit	End Sem Exam Marks		Sessional Marks	
				MAX	MIN	MAX	MIN
BCH CC-III-T (Major Course)	Proteins (Theory)	100	4	60	21	40	14
BCH CC-IV-T (Minor Course)	Enzymes (Theory)	100	4	60	21	40	14
BCH CC-III-P (Major Course)	Proteins – Lab	100	2	60	21	40	14
BCH CC-IV-P (Minor Course)	Enzymes – Lab	100	2	60	21	40	14
GE-II-T	Zoology-II (Animal Evolution, Development, Physiology, Behaviour and Wildlife) (Theory)	100	4	60	21	40	14
AECC-II-T	Environmental Science (Theory)	100	4	60	21	40	14
	Grand Total		20				

M. J. Jaiswal

CEO

Valis Kumar

B.Sc. [Honors] Biochemistry [CBCS Structure]

Major Core & Minor Courses (BCH CC – III & IV)

Generic Electives Course – II (GE – II)

Ability Enhancement Compulsory Course – II (AECC – II)

BCH CC – III – T (Major Course): Proteins (Theory)

BCH CC – IV – T (Minor Course): Enzymes (Theory)

BCH CC – III – P (Major Course): Proteins – Lab (Practical)

BCH CC – IV – P (Minor Course): Enzymes – Lab (Practical)

**GE – II - T - Zoology – II Animal Evolution, Development, Physiology,
Behaviour and Wildlife (Theory)**

AECC – II – T: Environmental Science (Theory)

My journal

ce

shirish

Major Core Course (Theory)

BCH CC – III – T (Major Course): Proteins (Theory)

Total Hrs: 60

Credit: 4

UNIT-I Introduction to amino acids, peptides and proteins, extraction and downstream processing & Separation techniques

1. Amino acids and their properties - hydrophobic, polar and charged. Biologically important peptides - hormones, antibiotics and growth factors.
2. Multimeric proteins, conjugated proteins and metallo proteins. Diversity of function
3. Solubilization of proteins from their cellular and extracellular locations. Use of simple grinding methods, homogenization, ultrasonication, French Press and Centrifugation
4. Ammonium sulphate fractionation, solvent fractionation, dialysis and lyophilization. Ionexchange chromatography, molecular sieve chromatography, hydrophobic interaction/reverse phase chromatography, affinity chromatography, HPLC and FPLC

UNIT-II Characterization of proteins

1. Determination of purity, molecular weight, extinction coefficient and sedimentation coefficient,
2. IEF, SDS-PAGE and
3. 2-D electrophoresis.

UNIT-III Covalent structure of Proteins

1. Organization of protein structure into primary, secondary, tertiary and quaternary structures. N-terminal and C-terminal amino acid analysis.
2. Sequencing techniques - Edman degradation. Generation of overlap peptides using different enzymes and chemical reagents.
3. Disulfide bonds and their location. Mass spectrometric analysis, tandem MS. Solid phase peptide synthesis

UNIT-IV Three dimensional structures of proteins and Protein Folding

1. Nature of stabilizing bonds - covalent and non covalent. Importance of primary structure in folding. The peptide bond - bond lengths and configuration. Dihedral angles psi and phi. Helices, sheets and turns.
2. Ramachandran map. Techniques used in studying 3-D structures - X-ray diffraction and NMR. Motifs and domains. Tertiary and quaternary structures. Structures of myoglobin and haemoglobin
3. Denaturation and renaturation of Ribonuclease A. Introduction to thermodynamics of folding and molten globule. Assisted folding by molecular chaperones, chaperonins and PDI.
4. Defects in protein folding. Diseases –Alzheimer's and Prion based.

UNIT-IV Introduction to protein structure databases and examples of metalloproteins

1. Protein sequence and structure databases (PDB). Use of sequence and domain information. Viewing protein structures using *in silico* tools.
2. Oxygen binding curves, influence of 2,3-BPG, CO₂ and Cl⁻.
3. Hill plot. Cooperativity between subunits and models to explain the phenomena - concerted and sequential models. Haemoglobin disorders.

My journal

Geo

Relax, Biscuits

UNIT-V Specialized proteins - antibodies and actin-myosin motors, membrane proteins

1. Antibody structure and binding to antigens. ATP activated actin - myosin contractions.
Membrane proteins- Integral and membrane associated proteins.
2. Hydropathy plots to predict transmembrane domains.
3. Significance of membrane proteins - bacteriorhodopsin.

Suggested Readings:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414-8.
2. Physical Biochemistry (2009) 2nd ed., Sheehan, D., Wiley-Blackwell (West Sussex), ISBN: 9780470856024 / ISBN: 9780470856031.
3. The Tools of Biochemistry (1977; Reprint 2011) Cooper, T.G., Wiley India Pvt. Ltd. (New Delhi), ISBN: 978-81-265-3016-8.

Chandana
aw
rekhavirudh

Major Core Course (Practical)

BCH CC – III – P (Major Course): Proteins – Lab (Practical)

Total Hrs: 30

Credit: 2

1. Estimation of proteins using UV absorbance and Biuret method.
2. Microassay of proteins using Lowry/Bradford method.
3. Isoelectric pH of casein.
4. Ammonium sulphate fractionation of serum proteins.
5. Separation of albumin from serum using anion-exchange chromatography.
6. SDS-PAGE analysis of proteins.

M. J. J. J.
ew
relia. Kiran

Minor Core Course (Theory)

BCH CC – IV – T (Minor Course): Enzymes (Theory)

Total Hrs: 60

Credit: 4

UNIT-1 Introduction to enzymes & Features of Enzyme catalysis

1. Nature of enzymes - protein and non-protein (ribozyme). Cofactor and prosthetic group, apoenzyme, holoenzyme.
2. IUBMB classification of enzymes.
3. Factors affecting the rate of chemical reactions, collision theory, activation energy and transition state theory, catalysis, reaction rates and thermodynamics of reaction.
4. Catalytic power and specificity of enzymes (concept of active site), Fischer's lock and key hypothesis, Koshland's induced fit hypothesis.

UNIT-2 Enzyme kinetics

1. Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant - monosubstrate reactions.
2. Michaelis-Menten equation, Lineweaver Burk plot, Eadie-Hofstee and Hanes plot. K_m and V_{max} , K_{cat} and turnover number.
3. Effect of pH, temperature and metal ions on the activity of enzyme.
4. Types of bi bi reactions (sequential – ordered and random, ping pong reactions). Differentiating bi substrate mechanisms (diagnostic plots, isotope exchange).

UNIT-III Enzyme inhibition

1. Reversible inhibition (competitive, uncompetitive, non-competitive, mixed and substrate).
2. Mechanism based inhibitors - antibiotics as inhibitors.
3. Control of activities of single enzymes (end product inhibition) and metabolic pathways, feedback inhibition (aspartate transcarbamoylase)

Unit-IV Mechanism of action of enzymes and Regulation of Enzyme Activity

1. General features - proximity and orientation, strain and distortion, acid base and covalent catalysis (chymotrypsin, lysozyme).
2. Metal activated enzymes and metalloenzymes, transition state analogues.
3. Reversible covalent modification phosphorylation (glycogen phosphorylase). Proteolytic cleavage- zymogen.
4. Multienzyme complex as regulatory enzymes. Occurrence and isolation, phylogenetic distribution and properties (pyruvate dehydrogenase, fatty acyl synthase)
5. Isoenzymes - properties and physiological significance

UNIT-V Involvement of coenzymes in enzyme catalysed reactions & Applications of Enzymes

1. TPP, FAD, NAD, pyridoxal phosphate, biotin, coenzyme A, tetrahydrofolate, lipoic acid
2. Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase, alkaline and acid phosphatases), enzyme immunoassay (HRPO)
3. Enzyme therapy (Streptokinase).
4. Immobilized enzymes.

My name

See
relax hand

Suggested Readings:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292-3414-8.
2. Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
3. Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Muhammad
Qadri
Nehal Kiran

Minor Core Course (Practical)

BCH CC – IV – P (Minor Course): Enzymes – Lab (Practical)

Total Hrs: 30

Credit: 2

1. Partial purification of acid phosphatase from germinating mung bean.
2. Assay of enzyme activity and specific activity, e.g. acid phosphatase.
3. Effect of pH on enzyme activity
4. Determination of K_m and V_{max} using Lineweaver-Burk graph.
5. Enzyme inhibition - calculation of K_i for competitive inhibition.
6. Continuous assay of lactate dehydrogenase.
7. Coupled assay of glucose-6-phosphate dehydrogenase.

Myamal

Sw.
valiur-hiraulam

B.Sc. [Honors] Biochemistry [CBCS Structure]

Generic Electives Course – II (GE – II)

**Zoology – II Animal Evolution, Development, Physiology, Behaviour
and Wildlife [Theory Course is offered by SOS in Zoology]**

Muzamil

ratish divakar

Generic Elective – II (Theory)

Zoology-II Animal Evolution, Development, Physiology, Behaviour and Wildlife [Theory Course is offered by School of Studies in Zoology]

Total Hrs: 60

Credit: 4

UNIT-I Developmental Biology

1. Gametogenesis: Spermatogenesis and oogenesis
2. Mode of Fertilization: Sea Urchin and Mammals
3. Conceptual Idea of development of Chick
4. Regeneration (Liver, *Hydra*, *Planaria*)

UNIT-II Evolutionary Biology

1. Concept and theories of organic evolution: Lamarckism, Darwinism, Neo-Darwinism.
2. Hardy- Weinberg theory of natural population, allele/gene and genotype frequency, Factors affecting allele frequency.
3. Zoo-geological time scale
4. Genetic polymorphism and ecological adaptation/speciation
5. Isolating mechanisms

UNIT-III: Vertebrate (Mammalian) Physiology

1. Respiration
 - a. Mechanism and regulation of breathing
 - b. Transport of oxygen and carbon dioxide
2. Circulation:
 - a. Blood properties and Circulation
 - b. Introduction to structure and function of Heart, Cardiac cycle and ECG
3. Nervous System
 - a. Structure and types of neuron
 - b. Physiology of nerve impulse conduction
4. Reproduction System
 - a. General plan of gonads and urino-genital ducts
 - b. Types of uterus

UNIT-IV: Fundamentals of Endocrinology

1. Distribution, Structure and Types of endocrine glands in mammals.
2. Neuroendocrine system: Hormones of Hypothalamus and Pituitary gland.
3. Regulation of neuroendocrine system.
4. Insect hormones

UNIT-V: Animal Behaviour and wildlife

1. Concepts of patterns of Behaviour
2. Reproduction and social behaviour
3. Biological rhythms
4. Migration: orientation and Navigation

Prasanna

Prasanna

5. Wildlife conservation: National parks and sanctuaries, Community reserves; Tiger conservation in India.

Suggested Readings:

1. Rastogi: Organic Evolution (2007, Kedarnath & Ramnath)
2. Futuyma: Evolutionary Biology (2005, Sinauer)
3. Hall and Hallgrímsson: Strickberger's Evolution (2008, Jones and Bartlett).
4. Ganong: Review of Medical Physiology (22nd ed. 2005, Lange Medical).
5. Guyton and Hall: A text book of Medical Physiology (11th ed. 2006m Sayders).
6. Keele and Neil: Samson Wright's Applied Physiology (13th ed. 1989, Oxford).
7. Hadley: Endocrinology (5th ed. 2000, Prentice Hall)
8. Norris: Vertebrate Endocrinology, 4th ed., 2007, Academic Press.
9. Alcock: Animal Behaviour, An Evolutionary Approach (10th ed. 2015, Sinauer).
10. Drickamer, Vessey and Jakob: Animal behaviour- Mechanism, Ecology, Evolution (5th ed. 2002, McGraw-Hill).
11. Dagatkin: Principle of animal behaviour (3rd ed. 2014, Norton and Company).
12. Manning and Dawkins (1998): An introduction to animal behaviour (5th ed. 1998, Cambridge).
13. Balinsky: An Introduction to Embryology (1981, CBS).
14. Gilbert: Developmental Biology (8th ed. 2006, Sinauer).
15. Wolpert: Principles of Development (3rd ed. 2007, Oxford)
16. Chanda S. K. (1992): Conserving wildlife in India.

Myamal
ee
veludivan

B.Sc. [Honors] Biochemistry [CBCS Structure]

**Ability Enhancement Compulsory Course - II
[AECC-II]**

AECC – II Environmental Science (Theory Course)

(Theory Course is offered by the School of Studies in Environmental Science)

Pranav
ee
Pranav

AECC-II

Environmental Science

[This theory Course is offered by the School of Studies in Environmental Science]

Total Hrs: 60

Credit: 4

UNIT-I

1. Basic concepts and issues, global environmental problems - ozone depletion, UV-B,
2. Greenhouse effect and acid rain due to anthropogenic activities, their impact and biotechnological approaches for management.
3. Environmental pollution - types of pollution, sources of pollution, measurement of pollution
4. Methods of measurement of pollution, fate of pollutants in the environment,

UNIT-II Environmental Pollution and Population

1. Air, water, noise, heat and nuclear pollution- definition, causes, effect and prevention of pollution
2. Population growth, disparities between countries
3. Population explosion, family welfare program
4. Environment and human health
5. Cleanliness and disposal of domestic waste

UNIT-III Resources and conservation

1. Natural resources, problems and conservation
2. Water resources
3. Forest resources
4. Land resources

UNIT-IV Resources and Disaster Management

1. Food resources
2. Energy resources
3. Disaster Management and Environmental laws
4. Disaster Management- Food, earthquake, cyclones and landslides

UNIT-IV Laws for conservation and Protection of Environment

1. Conservation of laws for air pollution
2. Conservation of laws for water pollution
3. Wildlife conservation laws
4. Role of information technology in protecting environment and health

Suggested Readings:

1. Waste water Engineering - treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi.
2. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi.
3. Bioremediation, Baaker, KH and Herson D.S., 1994. Mc.GrawHillInc, NewYork.
4. Environmental Molecular Biology, Paul. A, Rochelle, 2001.Horizon Press.
5. Environmental Protection and Laws by Jadhav and Bhosale, V.M.Himalaya publ. House 13. Biodiversity Assessment and Conservation by PC Trivedi, Agrobios publ.

Pranjal

Pranjal

6. Air Pollution and Health by J. G. Ayres, Editors- J. G. Ayres, Robert L. Maynard, R. Richards
7. Environmental Pollution: Management and Control for Sustainable Development by R.K.Khitoliya, S. Chand

Mujamal

Dr. R.K. Khitoliya