



List of New Course(s) Introduced

Department : Zoology

Programme Name : M. Sc.

Academic Year : 2018-19

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	LZT 303 C	Biochemistry of Intermediary Metabolism
02.	LZT 303 D	Molecular Biology of Information Pathway: Nucleic acid
03.	LZT 304 A	Brain and Neuron
04.	LZT 402 A	Proteins and Enzymology
05.	LZT 403 A	Medical Biochemistry

A. V. K. Bhasara

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Department of Zoology
गुरु घासीदास वि.वि., बिलासपुर
Guru Ghasidas Vishwavidyalaya, Bilaspur



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2018-19

School : School of Studies of Life Sciences

Department : Zoology

Date and Time : July, 07, 2017- 09: 30 to 06:30 PM

Venue : Zoology Department

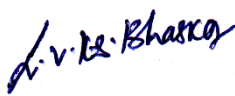
The scheduled meeting of member of Board of Studies (BoS) of Department of Zoology, School of Studies of Life Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the M. Sc. (I to IV semesters) scheme and syllabi.

The following members were present in the meeting:

1. Prof. Renu Maheshwari (External Expert Member BoS, Dept. of Zoology, Raipur)
2. Dr. Monika Bhadauria (HOD, Associate Prof., Dept. of Zoology.-cum Chairman, BOS)
3. Dr. Seema Rai (Member BoS, Associate Professor, Dept. of Zoology)
4. Dr. Santosh Singh (Member, Assistant Professor, Dept. of Zoology)

The committee discussed and approved the scheme and syllabi. The following new courses were introduced in the M. Sc. Zoology for III and IV semesters:

Sr. No.	Course Code	Name of the Course
01.	LZT 303 C	Biochemistry of Intermediary Metabolism
02.	LZT 303 D	Molecular Biology of Information Pathway: Nucleic acid
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Signature & Seal of HoD



Scheme and Syllabus

Department of Zoology, GGV, Bilaspur (CG)

Core Course Practical 4	LZI 206	Lab. Exercises based on course LZT 203 and 204	6	3	40	60	100
Skill Course II	LZS 207	Scientific Presentation skill (Oral & Poster)	2				
				22	240	360	600
Semester IIIrd							
Core Course 9	LZT 301	Molecular Genetics	4	4	40	60	100
Core Course 10	LZT 302	Histological Techniques and Biostatistics	4	4	40	60	100
Discipline Specific Elective - <i>Biochemistry and Molecular Biology (A) - 1</i>	LZT 303 A	Biochemistry of Intermediary Metabolism	4	4	40	60	100
Discipline Specific Elective - <i>Biochemistry and Molecular Biology (A) - 2</i>	LZT 304 A	Molecular Biology of Information Pathway: Nucleic Acids	4	4	40	60	100
Discipline Specific Elective - <i>Mammalian Reproductive Physiology and Endocrinology (B) - 1</i>	LZT 303 B	Neuroendocrinology and Non-Classical Hormones	4	4	40	60	100

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Discipline Specific Elective - Mammalian Reproductive Physiology and Endocrinology (B)-2	LZT 304 B	Male and Female Reproduction	4	4	40	60	100
Discipline Specific Elective - Fish Biology (C)-1	LZT 303 C	Fish Culture and Pathology	4	4	40	60	100
Discipline Specific Elective - Fish Biology (C)-2	LZT 304 C	Fish Anatomy and Physiology	4	4	40	60	100
Discipline Specific Elective - Neuroscience (D)1	LZT 303 D	Brain and Neuron	4	4	40	60	100
Discipline Specific Elective - Neuroscience (D)2	LZT 304 D	Developmental Neurobiology	4	4	40	60	100
Discipline Specific Elective - (E) Toxicology 1	LZT 303 E	An Introduction to Toxicology	4	4	40	60	100
Discipline Specific Elective - (E) Toxicology 2	LZT 304 E	Occupational and Environmental Toxicity	4	4	40	60	100

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Core Course Practical 5	LZL 305	Lab. Exercises based on courses LZT 301 & 302	6	3	40	60	100
Discipline Specific Elective Practical - 1 (elective)	LZL 306	Lab. Exercises based on courses LZT 303 & 304 (A to E)	6	3	40	60	100
				22	240	360	600
Semester IVth							
Core Course 11	LZT 401	Animal Behaviour and Environmental Biology	4	4	40	60	100
Discipline Specific Elective - Biochemistry and Molecular Biology (A) - 3	LZT 402 A	Proteins and Enzymology	4	4	40	60	100
Discipline Specific Elective - Biochemistry and Molecular Biology (A) - 4	LZT 403 A	Medical Biochemistry	4	4	40	60	100
Discipline Specific Elective - Mammalian Reproductive Physiology and Endocrinology (B) - 3	LZT 402 B	Hormone Receptors and Signaling Mechanisms.	4	4	40	60	100

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Major Elective Course A: *Biochemistry and Molecular Biology*

LZT 303 A: Biochemistry of Intermediary Metabolism

Unit 1: Overview of Metabolism: Concept of Metabolism, ATP as "Energy Currency of cell"; coupled reaction; Use of reducing equivalents and cofactors; Intermediary metabolism and regulatory mechanism

Unit 2: Carbohydrate: Structure and classification; Glycogenesis and glycogenolysis; Glycolysis and gluconeogenesis; Krebs cycle; Pentose phosphate pathway; Glyoxylate pathway

Unit 3: Lipids: Structure and types; Fatty acid: biosynthesis and degradation; Cholesterol: biosynthesis and degradation; Lipid transport and storage; Eicosanoids: classification, biosynthesis and functions

Unit 4: Amino acids: Structure and Classification; Amino acids as source for nitrogen; Synthesis and significance of polyamines; Amino acid catabolism: Transamination, Deamination: transdeamination and oxidative deamination; Toxicity of ammonia: Ammonia detoxification; Urea cycle: Reactions and their regulation, Evolution of urea cycle

Unit 5: Oxidative Phosphorelation; Redox systems; Mitochondrial respiratory chain, Inhibitors and un-couplers of electron transport system

Books Recommended

1. Nelson et al: Lehninger Principles of Biochemistry (5th ed, 2005 MacMillan Worth)
2. Berg et al: Biochemistry (5th ed 2002, Freeman)
3. Mathews et al: Biochemistry (3rd ed 2004, Pearson)
4. Zubay et al: Principles in Biochemistry (2nd ed 1995, WCB)
5. Rawn: Biochemistry (1989, Neil Patterson)
6. Bender: Amino acid metabolism, (1985, John Wiley)
7. Grisolia et al: The Urea Cycle (1976, John Wiley)
8. Voet & Voet: Biochemistry Vol I & II (3rd ed 2004, Wiley)

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Major Elective Course A: *Biochemistry and Molecular Biology*

LZT 304 A: Molecular Biology of Information Pathway: Nucleic Acids

Unit 1: Eukaryotic genome: Introduction to structural and functional genomics, Denaturation and renaturation of DNA, unique and repetitive DNA, sequences (LINEs, SINES), Chromatin organization, Nucleosomes and higher order structures, Histones and non-histone chromosomal proteins, Telomere, Chromatin modifications.

Unit 2: DNA replication, repair and recombination: DNA polymerases in prokaryotes and eukaryotes, Eukaryotic chromatin replication and regulation; DNA repair: Multiple DNA repair system: Mismatch repair, Base excision repair, Nucleotide excision repair, Direct repair; DNA recombination: Homologous genetic recombination.

Unit 3: Transcription and its regulation: RNA polymerases in prokaryotes and eukaryotes, Transcription factors: general and specific, Assembly of pre-initiation complex and initiation. Elongation, Transcriptome, Promoter analysis and characterization, Deletion mapping, S1/RNase mapping, Chromatin immunoprecipitation (ChIP), Electrophoretic mobility shift assay, DNase I footprinting.

Unit 4: Post transcriptional processing and regulation: Introns: types and mechanisms of splicing, RNA editing, Post transcriptional gene silencing (RNA interference); Catalytic RNA and its role.

Unit 5: Genetic engineering: Tools: Restriction enzymes and other enzymes for DNA manipulation, Vector types: cloning, and expression, Probes; Cloning strategies: cDNA and genomic libraries, Positional cloning; Screening of clones: Preparation of probes, Hybridization: Southern, Northern (colony/plaque), immuno-screening; Characterization of clones: Sequencing, Microarray; PCR and its applications, Application: transgenic organisms and genetically modified organisms (GMOs), animal cloning, site-directed mutagenesis, generation of knock-out animals, gene therapy.

Books Recommended

1. Malacinski; Freifelder's Essentials of Molecular Biology (4th ed 2005, Narosa)
2. Lewin: Genes IX (2008, Jones and Bartlett)
3. Brown: Genomes (3rd ed 2006, Garland Science)
4. Brown: Gene Cloning and DNA Analysis (2001, Blackwell)
5. Sambrook & Russell: Molecular Cloning (2001, Cold spring Harbor)

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Major Elective Course D: Neuroscience

LZT 303 D: Brain and Neuron

Unit 1: Anatomy of the Brain: Organization of the nervous system; Subdivisions of the nervous system; The scalp, skull and meninges; Cerebrospinal fluid; Central, autonomic and peripheral nervous system; The Nissl and Golgi stains.

Unit 2: Compartments of the Brain: The Cerebellum: gross anatomy of the cerebellar cortex, central nuclei, cerebellar peduncles; Functional anatomy of cerebellum; Cerebral cortex: Histology, general organization and functional localization; Descending motor pathways; Thalamus: Scheme of thalamic organization, nuclei of the thalamus; Basal ganglia: Corpus striatum, subthalamic nucleus, substantia nigra; Ascending sensory pathways.

Unit 3: Neuron: An overview of the nervous system, anatomy of the neuron, classification and type of the neurons; structure and function of dendrite & axon; ultrastructure and properties of the synapse.

Unit 4: Glial cells: Structure and function of glial cells; Types of glial cells: astrocytes, oligodendrocytes and Schwann cells; Types of astrocytes - type I & II astrocytes, fibrous and protoplasmic astrocytes; Role of astrocytes in glutamate metabolism and blood brain barrier; Function of other glial cells: oligodendrocyte and microglial cells, Microglial phenotypes, Overview of glial and neuronal relationship in the CNS, Glial - neuronal interplay in brain.

Unit 5: Neurosecretory Cells: Neuroendocrine transduction and neuroendocrine system; Basic aspects of neuroendocrine integration; Cellular mechanisms of neuroendocrine integration; Clinical neuroendocrinology.

Books Recommended

1. Siegel, Basic Neurochemistry (7th Edition) Academic Press, 2006
2. Alberts, Molecular Biology of the Cell (5th Edition) Garland Science, 2008
3. Kandel, Principles of Neural Science (4th edition), McGraw Hill, 2000
4. Verkhratsky, Glial Neurobiology, A Text Book, Wiley, 2007
5. Richard F. Thompson: The Brain - A Neuroscience Primer (2nd Ed. 1993, W. H. Freeman & Company)
6. Fink, Pfaff & Levine: Handbook of Neuroendocrinology (1st Ed. 2012, Academic Press)
7. Longstaff, A: Neuroscience (3rd ed. 2012, Garland Science).

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Major Elective Course A: *Biochemistry*

LZT 402 A: Proteins and Enzymology

Unit 1: Protein structure: Determination of primary structure: Amino acid composition, N- and C- terminal determination, Amino acid sequence determination; Forces and interactions involved in structural organization of fibrous and globular proteins; Structure function relationship; Protein denaturation; Molecular chaperones and protein folding

Unit 2: Proteins synthesis and processing: Translation; Ribosome, formation of initiation complex, initiation factors and their regulation, elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, translational proof-reading, translational inhibitors, Post- translational modification of proteins; Post translational processing; Protein targeting and degradation

Unit 3: Enzymes: Nomenclature and classification; Mechanism of enzyme action: Enzyme substrate binding, Binding energy, entropy change; Active site structure and determination: irreversible inhibitors, Enzyme distribution, diversity and evolution; Coenzymes and cofactors

Unit 4: Kinetics: Single substrate reactions: steady state and equilibrium kinetics; Michaelis-Menten equation and plot; Linear kinetic plots: Lineweaver-Burk, Edie-Hofstee, Cornish-Bowden; Calculations on enzyme kinetics; Multi-substrate reactions: Random sequential, Ordered, Theorel-Chance mechanism, Ping-pong (double reciprocal) mechanism

Unit 5: Enzyme inhibition and regulation: Competitive; non-competitive; un-competitive and mixed; Determination of nature of inhibition and K_i by L-B and Dixon plots; Regulation: allosterism and covalent modifications; Multi-enzyme complex and multifunctional enzymes

Books Recommended

1. Nelson et al: Lehninger Principles of Biochemistry (3rd ed 2000, MacMillan Worth)
2. Berg et al: Biochemistry (5th ed 2002, Freeman)
3. Mathews et al.: Biochemistry (3rd ed 2004, Pearson)
4. Zubay et al: Principles in Biochemistry (2nd ed 1995, WCB)
5. Rawl: Biochemistry (1989, Neil Patterson)
6. Mahler & Cordes: Textbook of Biological Chemistry(1966, Harper)
7. Price & Stevens: Fundamentals of Enzymology (2nd ed 1988, Oxford University Press)
8. Engel: Enzyme kinetics: The steady state approach(1981, Chapman and Hall)
9. Segal: Biochemical calculations (2nd ed 1976, John Wiley)
10. Fersht: Enzyme Structure and Mechanisms (2nd ed 1985, Freeman)

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Department of Zoology, GGV, Bilaspur (CG)

Major Elective Course A1 *Biochemistry*

LZT-403 A1 Medical Biochemistry

Unit 1: Biochemical basis of diseases/disorders: Biochemistry, diagnosis and treatment of diseases; Molecular deficiency disorders: Enzyme deficiency: Inborn errors of metabolism, Alkaptonuria, Phenylketonuria, Protein defects/ deficiency: Cystic fibrosis, Sickle cell anaemia, Thalassemia; Transport/storage associated disorders: Hypercholesterolemia and atherosclerosis; A-Beta-lipoproteinemia; Tay-Sachs disease; Gout

Unit 2: Apoptosis and its implications in health and disease: Process of apoptosis: Induction and biochemical changes, Execution: cytochrome C release, caspase action, Phagocytosis of apoptotic bodies; Regulation of apoptosis: extra- and intra-cellular; Implications: Programmed cell death and development, Development of immunological tolerance, Neurological disorders

Unit 3: Cancer and Medical gerontology: Basic concept of signal transduction and cell division, Cancer: Biochemical aberrations, Therapeutic strategies: TNF- α induced, immunological cytotoxicity, chemotherapy and radiotherapy; Medical gerontology

Unit 4: Drug action, abuse and catabolism: Mechanisms, Drug addiction, alcohol toxicity, Catabolism of drugs

Unit 5: Recent trends in therapy: Biomolecules as diagnostic markers and therapeutic agents; Gene technology and gene therapy; Drug delivery and targeting

Books Recommended

1. Murray et al: Harper's Illustrated Biochemistry (27th ed 2006, McGraw Hill)
2. Ganong: Review of Medical Physiology (21st ed 2003, Lange Medical Publications)
3. Alberts et al: Molecular Biology of the Cell (4th ed 2002, Garland)
4. Goldsby et al: Immunology (5th ed 2003, Freeman)
5. Bhargava: Medical Biochemistry (4th ed 2004, Hap)
6. Goodman et al: The Pharmacological Basis of Therapeutics (7th ed 1991, Macmillan Publishers)
7. Smith & Marks: Basic Medical Biochemistry (2nd ed 2005, LWW Lippincott's)
8. Chatterjee & Shinde: Medical Biochemistry (6th ed 2005, Jaypee brothers)
9. Bennett & Brown: Clinical Pharmacology (9th ed 2005, Elsevier)
10. Saini & Kaur: Clinical Biochemistry (1st ed 2001, CBS Publ)
11. Kanungo: Biochemistry of Aging (1980, Academic Press)
12. Kanungo: Genes and Aging (1994, Cambridge University Press)

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