



List of Revised Courses

Department : **Zoology**

Programme Name : **M. Sc**

Academic Year : **2020-21**

List of Revised Courses

Sr. No.	Course Code	Name of the Course
01.	LZT 102	Cell Biology
02.	LZT 103	Reproduction and Developmental Biology
03.	LZT 201	Biochemistry and Molecular Biology
04.	LZT 204	Biotechniques

A. V. K. Bhasra

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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 : 2020-21

School : School of Studies in Life Sciences

Department : Zoology

Date and Time : 18 Aug, 2020 - 11:30 AM

Venue : Department of Zoology

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. Zoology (I to IV sem) scheme and syllabi.

The following members were present in the meeting:

1. Prof. Shivkant Kumar Prasad (External Expert Member BoS, Dept. of Biosciences, Pandit Ravishankar Shukla University).
3. Prof. LVKS Bhaskar (HOD, Dept. of Zoology.-cum Chairman, BOS)
4. Dr. Rohit Seth (Member BoS, Associate Professor, Dept. of Zoology)
5. Dr. Sushant Kumar Verma (Member, Assistant Professor, Dept. of Zoology)

The committee discussed and approved the scheme and syllabi. The following courses were revised in M. Sc. Zoology (I to II Semesters):

Sr. No.	Course Code	Name of the Course
01.	LZT 102	Cell Biology
02.	LZT 103	Reproduction and Developmental Biology
03.	LZT 201	Biochemistry and Molecular Biology
03.	LZT 204	Biotechniques

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Signature & Seal of HoD



Scheme and Syllabus

Semester-wise Theory Papers/ Practical: Masters of Science in Zoology

Department of Zoology, School of Life Science

Type of Course	Course Code	Title of the Course	Lecture- Tutorial- Practical / week	No. of credits	Continuous Compreh- ensive Assessment (CCA)	End- Semester Exam. (ESE)	Total
Semester - Ist							
Core Course 1	LZT 101	Comparative Anatomy of Vertebrates	4	4	40	60	100
Core Course 2	LZT 102	Cell Biology	4	4	40	60	100
Core Course 3	LZT 103	Reproduction and Developmental Biology	4	4	40	60	100
Core Course 4	LZT 104	Basic Mammalian Physiology	4	4	40	60	100
Core Course Practical 1	LZL 105	Lab. Exercises based on courses LZT 101 and 102	6	3	40	60	100
Core Course Practical 2	LZL 106	Lab. Exercises based on courses LZT 103 and 104	6	3	40	60	100
				22	240	360	600
Semester IInd							
Core Course 5	LZT 201	Biochemistry and Molecular Biology	4	4	40	60	100
Core Course 6	LZT 202	Regulatory Mammalian Physiology	4	4	40	60	100
Core Course 7	LZT 203	Endocrinology	4	4	40	60	100
Core Course 8	LZT 204	Biotechniques	4	4	40	60	100
Core Course Practical 3	LZL 205	Lab. Exercises based on course LZT 201 and 202	6	3	40	60	100
Core Course Practical 4	LZL 206	Lab. Exercises based on course LZT 203 and 204	6	3	40	60	100
				22	240	360	600
Semester IIIrd							
Core Course 9	LZT 301	Molecular Genetics	4	4	40	60	100
Core Course 10	LZT 302	Animal Behavior	4	4	40	60	100

S. Singh

J.K. ...

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Department of Zoology, GGV, Bilaspur (CG)

SEMESTER I

LZT 102: CELL BIOLOGY

Unit 1: Basic structure of prokaryotic and eukaryotic cell: Ultrastructure of cell membrane (Fluid mosaic model), membrane proteins and lipids, mitochondria, assemblies of respiratory chain and F₀F₁-ATPase, golgi complex, endoplasmic reticulum and lysosome; structure and functions of centrosome; Cell junctions: Tight and gap junctions, Desmosomes.

Unit 2: Nucleic acids: Chemical and Physical structure; Chromatin/Chromosome: Nucleosome and higher order structure (Solenoid to Metaphase chromatid); Nucleolus: Structure and biogenesis of ribosomes.

Unit 3: Cytoskeleton: Organization of microtubules, microfilaments and intermediary filaments; Protein sorting and mechanisms of vesicular transport: Signal peptide and SRP dependent targeting of translational complex; targeting to plasma membrane and lysosome; targeting of nuclear and mitochondrial proteins.

Unit 4: Transport across the cell membrane: Channels and transporters, diffusion, osmosis and measurement of osmotic pressure; Active transport: mechanism and related calculations; Cell signaling molecules and receptors, Signal transduction pathways (DAG and cAMP); Cell interactions: Apoptosis and necrosis.

Unit 5: Cell cycle and cancer: Mitotic and Meiotic cell divisions and their significance, spindle apparatus and synaptonemal complex, cell cycle and its regulation, labeling index and cell cycle duration measurement, cell synchronization and cell cycle inhibitors; Cancer (Concept of oncogene and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras and APC).

Books Recommended

1. Alberts et al. (2008) Molecular Biology of the Cell, 5th Ed. Garland Publishing House.
2. Cooper GM (2004) The Cell, 3rd Ed. ASM Press.
3. Hardin et al. (2012) Becker's World of the Cell, 8th Ed. Pearson Benjamin Cummings.
4. Karp (2008) Cell and Molecular Biology-Concepts and Application, 5th Ed. John Wiley.
5. Lewin B (2008) Genes IX, Jones and Bartlett Publishers.
6. Lodish et al (2016) Molecular Cell Biology, 8th Ed. W.H. Freeman.
7. Tamarin RH (2004) Principles of Genetics. Tata McGraw-Hill Publishing Comp. Ltd.
8. Watson et al. (2007) Molecular Biology of the Gene. 6th Ed. Benjamin Cummings.

Percent Change From Previous Syllabus: 50.0 %

Course Objective:

To study the structure and function of different component of prokaryotic and eukaryotic cell.
To study basis of cancer, tumor processing and cell communication.

Course Outcomes:

Students will develop ability to understand how a cell works in molecular level.
Develop in-depth knowledge of components of cell and their working.
Students will develop understanding about how different components pass through the plasma membrane differently.

Signature

Signature



Department of Zoology, GGV, Bilaspur (CG)

SEMESTER I

LZT 103: REPRODUCTION AND DEVELOPMENTAL BIOLOGY

Unit 1: Reproduction biology: Structure of mammalian testis and ovary; Spermatogenesis and structure of sperm; Oogenesis and structure of egg; Male and female accessory sex organs; Hormones of testis and ovary; Estrous and menstrual cycle; Hormones of pregnancy; Parturition; Hormonal control of lactation.

Unit 2: Fertilization and development: Biochemical aspect of fertilization; penetration and activation of egg and early development; Fate maps; embryonic induction and differentiation; Cell adhesion and cell communication; Hormonal control of metamorphosis in amphibians; Neuro endocrine control of insect metamorphosis; Biochemistry and mechanism of action of hormones during metamorphosis.

Unit 3: Late embryonic development: Development and patterning of vertebrate limb, homeobox genes in patterning, signaling in patterning of the limb; Insect imaginal disc-organizing center in patterning of the leg and wing, the homeotic selector genes for segmental identity; Organizer, inductive tissue interactions in developments.

Unit 4: Genetic errors of human development: Nature of human syndromes-pleiotropy, genetic heterogeneity, phenotypic variability, gene expression and human disease-inborn errors of nuclear RNA processing, inborn errors of translation; teratogenesis-environmental assaults on human development- teratogenic agents like alcohol, retinoic acid etc.

Unit 5: Regeneration: Epimorphic regeneration of reptile (salamander) limb; Morpholaxis regeneration in hydra; embryonic stem cells and their applications. Programmed cell death: apoptosis, autophagy and necrosis.

Reference Books:

1. Hadley M (1992) Endocrinology, 3rd Ed. Prentice - Hall Inc. A Simon & Schuster Company, Englewood Cliffs, New Jersey. USA.
2. Turner CD and Bangara JT (1986) General Endocrinology, Toppan Com Lim Tokyo.
3. Negi SC (2009) Introduction to Endocrinology, Prentice Hall Learning Pvt Limited.
4. Balinsky BI (1981) An Introduction to Embryology, W B Saunders Co., Philadelphia.
5. Karp G and Berrill NJ (1981) Development, McGraw Hill, New York.
6. Saunders JW (1982) Developmental Biology, MacMillan Co., London.
7. Gilbert SF (2003) Developmental Biology, Sinamer Associates Inc. USA.
8. Oppenheimer SB (1980) Introduction to Embryonic Development, Allyn and Bacon

Percent Change From Previous Syllabus: 50.0 %

Course Objective:

Major objective is to provide student with a sound coverage of mammalian reproductive biology with in framework of human biology. Study will be achieved by learning fundamental of structure and function of male and female reproductive tract, gametogenesis, fertilization early embryonic fetal development till birth of young one.

Course Outcomes:

it will provide important function to consider sexual differentiation and development, infertility and current reproductive technology.



Department of Zoology, GGV, Bilaspur (CG)

SEMESTER II

LZT 201: BIOCHEMISTRY AND MOLECULAR BIOLOGY

Unit 1: Laws of thermodynamics and their applications: Concept of free energy and calculations based on free energy change; Metabolism: Concept of metabolic pathways; Energy transduction: glucose and fatty-acids as energy source; Glycolysis and Krebs cycle; Feeder pathway of glycolysis; Mechanism and chemiosmotic concept of ATP synthesis, bioenergetics of ATP and other high energy phosphate compounds; Digestion, mobilization, and transport of fats; β -oxidation; NADPH producing pathway; Pentose phosphate pathway.

Unit 2: Protein: Primary structure, peptide bond, Secondary structure, α -helix, β -pleated sheet and bends, prediction of secondary structure, Ramachandran plot, tertiary structure, forces stabilizing tertiary structure, Domains and motifs-Quaternary structure.

Unit 3: Enzymes: Enzyme kinetics, lowering of activation energy, derivation of Michaelis-Menten equation, related calculations and Michaelis-Menten and Lineweaver-Burk plots; Mechanism of action, active site, substrate binding, transition state analogues and abzyme; Acid-base and covalent catalysis; Concepts of regulation of enzyme activity.

Unit 4: Nucleic acids: Structure, folding motifs, conformational flexibility and supercoiling; Mechanism of DNA replication: DNA polymerases, origin of replication and formation of primosome, replication fork and replisome, termination of replication; DNA damage and repairing mechanism.

Unit 5: Mechanism of transcription: RNA polymerases, formation of pre-initiation complex at RNA *pol* II promoter; Processing of hnRNA: Capping, Poly(A) tailing, splicing; Genetic code and mechanism of translation: Role of ribosomes and tRNAs, formation of initiation complex; Elongation and termination; Post translational modification.

Books Recommended

1. Nelson et al (2004) Lehninger: Principles of Biochemistry, 3rd Ed. Pearson.
2. Zubay et al (1995) Principles in Biochemistry, 2nd Ed. WCB.
3. Strayer (2002) Biochemistry, 5th Ed.
4. Lodish et al (2007) Molecular Cell Biology, 6th Ed. Freeman and Company.
5. Voet and Voet (2004) Biochemistry, John Wiley.
7. Alberts et al. (2008) Molecular Biology of the Cell, 5th Ed. Garland Publishing House.
2. Cooper GM (2004) The Cell, 3rd Ed. ASM Press.
8. Price and Stevens (1988) Fundamentals of Enzymology, 2nd Ed. Oxford University Press.

Percent Change From Previous Syllabus: 18.0 %

Course Objective:

To build comprehensive working knowledge of biomolecules and their role in specific molecular transformations. To enable the students to develop an integrated approach for understanding the various life science problem at the molecular level.

Course Outcomes:

Students will recognize and interpret the structural and functional aspects of molecules and their interactions that give rise to the supramolecular complexes such as organelles and cells. Students will have the ability to perform laboratory techniques used in molecular biology and biochemistry.

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Department of Zoology, GGV, Bilaspur (CG)

SEMESTER II

LZT 204: BIOTECHNIQUES

Unit 1: Centrifugation, spectroscopy and chromatography: Basic principle and application of centrifugation, high speed and ultracentrifuge, types of rotors; UV-visible absorption spectrophotometry and its applications; Chromatography: Basic principle and application, Planar chromatography, gas chromatography, High performance liquid chromatography, ion exchange and affinity chromatography.

Unit 2: Microscopy: Basic principle and application, numerical aperture, limit of resolution, types of objectives; Types of microscope: Light (Bright-field and dark field microscope); phase contrast microscope, fluorescence microscope, confocal microscope, transmission and scanning electron microscope.

Unit 3: Microtomy: Basic principle of fixation, types and chemistry of fixation; Tissue processing: Dehydration, clearing, embedding and block preparation; Types of microtome; Histological stains: haematoxylin and eosin.

Unit 4: Electrophoresis: Principle, PAGE and agarose gel, isoelectric focusing of proteins; Blot techniques: Southern, Northern and Western.

Unit 5: Molecular tools: PCR, RT-PCR, real time PCR, restriction mapping, RAPD, RFLP, AFLP, Chromosome walking, site directed mutagenesis; Gel retardation assay, RNase protection assay; Protein sequencing, *in situ* localization- FISH and GISH; Microarray technique, ELISA.

Books Recommended

- 1 Bancroft and Stevens (2002) Theory and Practice of Histological Techniques, Churchill-Livingstone.
- 2 Boyer (1993) Modern Experimental Biochemistry and Molecular Biology, 2nd Ed. Benjamin/Cumin.
- 3 Karp (2007) Cell and Molecular Biology, Wiley.
- 4 Lodish et al (2007) Molecular Cell Biology, Freeman.
- 5 Plummer (1990) An Introduction to Practical Biochemistry, 3rd Ed. Tata-McGrawHill.
- 6 Pollard and Earnshaw (2002) Cell Biology, Saunders.
- 7 Ruthman (1970) Methods in Cell Research, Bell and Sons.
- 8 Wilson and Walker (2006) Principles of Biochemical and Molecular Biological Techniques, 6th Ed. Cambridge University Press.

Percent Change From Previous Syllabus: 50.0 %

Course Objective:

The aim of this course is to provide an advanced understanding of standard methodologies in biology that are commonly used in life science research.

Course Outcomes:

Student will get acquired with common laboratory techniques and can comfortably handle the instruments. Biotechniques are in high demand in academics, research and industry and play prominent role in biomedical and clinical research.