

DETAILED SYLLABUS

FIRST SEMESTER

**ZOOL. 101: STRUCTURE AND FUNCTION OF INVERTEBRATES**

UNIT - 1

- 1. Organization of coelom: Acoelomates, pseudocoelomates and coelomates
- 2. Protostomia and dueterostomia
- 3. Locomotion: Flagellar and cilliary movement in protozoa
- 4. Hydrostatic movement in Colenterata, Annelida and Echinodermata

UNIT - 2

- 5. Patterns of feeding and Digestion in lower Metazoa
- 6. Filter feeding in polychaeta, Mollusca and Echinodermata
- 7. Organs of respiration : Gills Lungs and trachea
- 8. Respiratory pigments and their functions
- 9. Mechanism of respiration and transport of gases

UNIT - 3

- 10. Organs of excretion: Coelom, coelomoducts and Malphigian tubules
- 11. Mechanism of excretion in invertebrates
- 12. Primitive Nervous system of Coelentrates and Echinoderms
- 13. Advanced Nervous system of Annelida, Arthropoda (Crustacea and Insecta) and Mollusca (Cephalopoda)

UNIT - 4

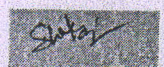
- 14. Trends in neural evolution
- 15. Larval forms of crustacean, mollusca and Echinodermata
- 16. Larval forms of invertebrate parasites
- 17. Strategies and evolutionary significance of larval forms

UNIT - 5

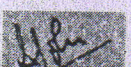
- 18. Organization and general character of Rotifera
- 19. Organization and general characters of Acanthocephala
- 20. Organization and general characters of Ectoprocta
- 21. Organization and general characters of Endoprocta
- 22. Organization and general characters of Phoronida

Suggested Readings:

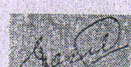
Hyman, L.H. the Invertebrates, Vol - 1 Protozoa through Ctenophora. Mc Graw Hill Co. New York.  
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 Bames, R.D. Invertebrate Zoology, 3<sup>rd</sup> edition W.B. Saunders Co. Phlladelphia.  
 Barrington B.J.W. Invertebrate structure and function, Thomas Neison and Sons Ltd. London.  
 Sedgwlok A.A. student Text Book of Zoology Vol. 1<sup>st</sup> 2<sup>nd</sup> and 3<sup>rd</sup> Central Book Depot, Allahabad.  
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Dr. Shakti Bhardwaj




Dr. Sonia Johari



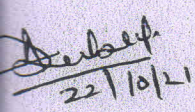
Dr. D.K. Sharma

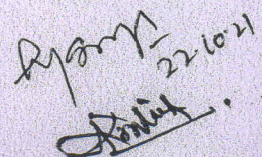


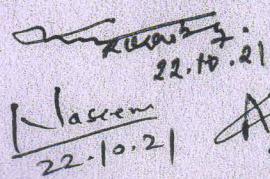
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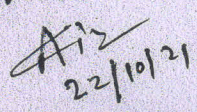


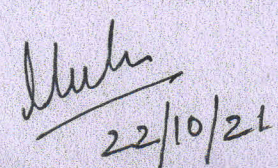
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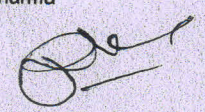
  
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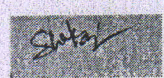
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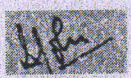
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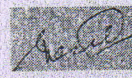
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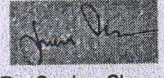
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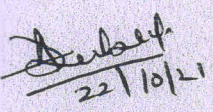
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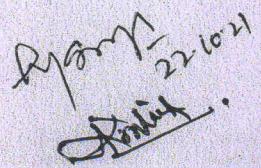


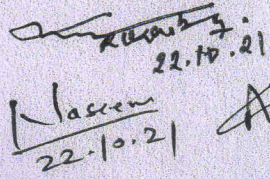
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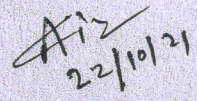


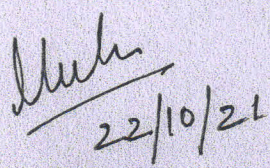
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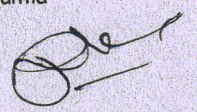
  
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**ZOOL, 102: BIostatistics, Bioinformatics and Research Methodology**

UNIT - 1

1. DISTRIBUTION: Normal , Binomial and Poisson
2. Hypothesis testing
3. Student's t test
4. Chi Square test
5. The mean, mode, median, standard deviation and Standard error of classified Data

UNIT - 2

6. Analysis of variance (one way and two way ANOVA )
7. Correlation
8. Regression
9. Graphic representation of data

UNIT - 3

10. Computers and their application in biology
11. Operation system: DOS WINDOWS
12. Application software: MS Word, MS Access
13. MS Excel, MS Power Point
14. Internet and its uses

UNIT - 4

15. Bioinformatics: Definition, history and scope
16. Analysis of DNA and protein sequences: molecular and genomic database (e.g., GENE BANK, SWISS - PROT and other databases)
17. Introductory ideas on use of database for sequence retrieval, similarity search and sequence alignment; post transcriptional modification prediction
18. Bioinformatics in drug discovery

UNIT - 5

19. Research: definition and meaning of research problem.
20. Research design
21. Research methodology
22. Interpretation of research outcome and writing report.

Suggested Readings:

- Batschelet, E. Introduction to Mathematics for Life Scientists. Springer - Verlag, Berlin.
- Jorgenson, S.E. Fundamentals of Ecological Modelling. Elsevier, New York.
- Swartzman, G. Land S.P.O. Kaluzny: Ecological Simulation Primer, Macmillan, New York.
- Lendren D. Modelling in Behavioral Ecology. Chapman and Hall, London, UK.
- Sokal, R.R. and F.J. Rohlf. Biometry. Freeman, San Francisco.
- Snedecor, G.W. and W.G. Cochran. Statistical Methods Assisted East - West Press, New Delhi (Indian Ed.)
- Green R.H. Sampling, Design and Statistical Methods for Environmental Biologists. John Wiley & Sons, New York.
- Murray, J.D. Mathematical Biology Springer Verlag Berlin.
- Pielou, E.C. The Interpretation of Ecological Data: A Primer on Classification and Ordination.
- Kothari C.R, Research Methodology: Methods & Techniques, New Age Publ. New Delhi 2012
- De Saplo, Calculus for Biologists.
- Rubinov, S.I. Introduction to Mathematical Biology.
- Saxena, V.P. 'Jalv Ganit EK Parichaya' (M.P. Hindi Granth Academy).
- Brown, S.M. Bioinformatics - A Biologists Guide to Biocomputing and Internet, Eaton Publishing, New York, 2000.
- Lesk, A.M. Introduction to Bioinformatics. Oxford, 2002.
- Bioinformatics Methods and Protocols, In: Methods in Molecular Biology. Vol. 132. Human Press, 2001.
- Higging & Taylor. Bioinformatics - Sequence, Structure and Databases Oxford, 2000.
- Baxevanis and Ouellette Bioinformatics John Wiley & Sons, 1998.
- Swindell Internet for the Molecular Biologists 3. Horizon Scientific, 1996.

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Kothari C.R, Research Mathodology: Methods & Techniques, NewAge Publ. New Delhi 2012  
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**ZOOL, 103 CELLULAR AND MOLECULAR BIOLOGY**

**UNIT - 1**

1. Biomembrances: Structure of Membrane (Fluid mosaic model) , Molecular composition of the membrane, functional significance
2. Transport across cell membranes: Simple diffusion and osmosis, facilitated diffusion (Transporters, uniports and antiports carries, symports, Ion channels), Active transport, Membrane pumps, bulk transport (Endocytosis and Exocytosis)
3. Cytoskeleton: Microfilaments: structure dynamics and functions, Microtubules: structure dynamics and functions.
4. Intracellular transport: Axonal transport, Transport of pigment in melanophores: role of kinesin and dynein.

**UNIT - 2**

5. Cell - cell adhesion and cell junctions : collagen and Non - collagen components of extracellular matrix of animal cells, Fibronectins and Integrins, cell adhesion proteins, their types.
6. Cell junctions (occluding, Anchoring & Gap Junctions)
7. Signal transduction mechanisms: Basic concept- (Intracellular and cell surface receptors, signal amplification, secondary messengers, signaling through G Protein coupled receptors (PKA, PKC), Enzyme linked receptor signaling (Growth factor receptor signaling, jacking pathway, Network and Crosstalk between different signaling mechanism, role of NO and CO in cell signaling.)
8. Apoptosis : Basic concept-

**UNIT - 3**

9. Neurons: General organization of neurons classification of neurons
10. Glia: Structure & Types of Glia, Function of glia
11. Synapses: Ultra structure of a synapse , Types of Synapses, Synaptic transmission: Electrical & chemical, Functions of nerve fibers
12. Muscle contraction: Excitation - contraction coupling and Sarcoplasmic reticulum.

**UNIT - 4**

13. Genome organization: Molecular organization of Gene Chromosomal organization of Gene
14. Organelle genome: Structure and function of mitochondrial genome.
15. Gene mutation: induced mutations spontaneous mutations
16. DNA damage and repair: Types of DNA damage , Basic pathway of DNA repair ,

**UNIT - 5**

17. Gene regulation in prokaryotes: DNA binding motifs, Lac operon, Tryptophan operon
18. Sex determination in Drosophila: Chromosomal basis, Molecular basis
19. Sex determination in mammals: Hormonal basis, Molecular basis
20. Basic Concepts of Dosage compensation in Drosophila, & mammals

**Suggested Readings:**

Albert et. Al. Essential Cell Biology, Garland Publishing Inc., New York, 1998.  
Albert, D. Bray J. Lewis, M. Raff, K . Roberts and J.D. Waston. Molecular Biology of the cell, B. Garland Publishing Inc. New York, 2001.  
Boney. Cell Biology Level 2<sup>nd</sup>. Macdonald & Evans, 1982.  
Darnell, J.H. Lodish and D. Baltimore. Molecular cell biology. Scientific American Book, Inc., USA  
De Robertis & De Robertis. Cell and Molecular Biology. Lea & febiger  
Gilbert Development Biology, sinauer, 2000,  
Karp. Cell and Molecular Biology John Willey & sons, New York, 1996.  
Lodish et al. Molecular Cell Biology. Freeman & Co., 2000.  
Tobin and Morcel Asking about Cells Saunders, 1997.

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Boney. Cell Biology Level 2<sup>nd</sup>. Macdonald & Evans, 1982.  
Darnell, J.H. Lodish and D. Baltimore. Molecular cell biology. Scientific American Book, Inc., USA  
De Robertis & De Robertis. Cell and Molecular Biology. Lea & Febiger  
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**ZOOL. 104: TOOLS AND TECHNIQUES FOR BIOLOGY**

Unit – 1

1. Microscopy, principle & application of : Light microscope, phase contrast microscope and fluorescence microscope
2. General principal and application of Electron microscope (TEM & SEM)
3. Principle and Application of Confocal microscopy
4. Cryotechniques : Cryopreservation of cells, tissues, organs and organism Freeze fracture & freeze drying

UNIT – 2

5. Principles and applications of photometry: Beer & Lambert's law, Absorption spectrum & absorption maxima
6. Colorimeter & spectrophotometer- working principles and applications
7. Flame photometer - working principles and applications
8. Atomic absorption spectrophotometer- working principles and applications

UNIT – 3

9. Separation techniques: Chromatography, principle, types and applications
10. Electrophoresis, principle, types & applications, PAGE and agarose gel electrophoresis
11. Radioisotopes in biology: units of radioactivity, Radioactive counters
12. Autoradiography

UNIT – 4

13. Techniques in immunodetection I : Immunocytochemistry & Immunohistochemistry ,,
14. Techniques in immunodetection II : Immunoblotting, and immunofluorescence
15. Histological techniques : principles and methods of perfusion, tissue fixation, Microtomy, cryotomy, and Histochemical staining: stereotaxy
16. Immunological techniques : Immunodiffusion and Immunoelectrophoresis

UNIT – 5

17. Cell culture techniques: Design and functioning of tissue culture laboratory,Culture media, essential components and preparation, Cell viability testing
18. Cytological techniques: Mitotic & Meiotic chromosome preparations from insects and vertebrates Chromosome banding techniques (G- C-, O-, R- banding etc.)
19. Molecular cytological techniques: In situ hybridization ( Radiolabelled & non – radiolabelled methods). FISH and Restriction banding
20. Molecular biology techniques: Southern hybridization and Northern hybridization DNA sequencing Polymerase chain reaction (PCR)

Suggested Readings:

- Bisen: Laboratory protocols in applied lifescience. CRC Press, 2014  
Clark & Switzer. Experimental Biochemistry. Freeman, 2000.  
Locquin and Langeron. Handbook of Microscopy, Butterwaths, 1983.  
Boyer, Modern Experimental Biochemistry, Benjamin, 1993.  
Frelfelder, physical Biochemistry, Freeman, 1982.  
Wilson and Walker, Practical Biochemistry, Cambridge, 2000.  
Cooper, The Cell A Molecular Approach ASM, 1997.  
John R.W. Masters. Animal Cell culture A practical approach, IRL Press.  
Rubert Braun, Introduction to instrumental analysis McGraw Hill Int. Ed. K. Willson & K. H. Goulding. A Biologist's Guide to principles & Techniques of practical Biochemistry. ELBS Ed.  
Veera kumari : Bioinstrumentation,MJP Publications, Chennai.

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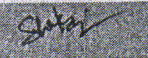
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17. Cell culture techniques: Design and functioning of tissue culture laboratory,Culture media, essential components and preparation, Cell viability testing
18. Cytological techniques: Mitotic & Meiotic chromosome preparations from insects and vertebrates Chromosome banding techniques (G- C-, O-, R- banding etc.)
19. Molecular cytological techniques: In situ hybridization ( Radiolabelled & non – radiolabelled methods). FISH and Restriction banding
20. Molecular biology techniques: Southern hybridization and Northern hybridization DNA sequencing Polymerase chain reaction (PCR)

Suggested Readings:

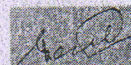
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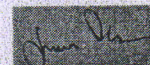
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Dr. D.K. Sharma



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