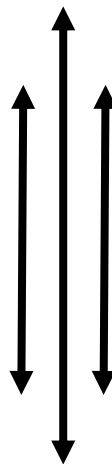


UNIVERSITY DEPARTMENT OF ZOOLOGY
VINOBA BHAVE UNIVERSITY
HAZARIBAG



Syllabus of M.Sc. (Zoology) as per CBCS Program
From the Academic year: 2018 -19 onwards

Syllabus of M.Sc. (Zoology) as per CBCS Programme From the Academic year: 2018 -19

A brief description of the course:

Purpose:

- ❖ To understand the importance of taxonomy and the biodiversity of fauna (non chordate and chordate) and their conservation.
- ❖ To study comparative structure and function of the different organ systems and their physiological importance in relation to habit and habitat of the organism.
- ❖ To understand the biochemical integrity of various life processes.
- ❖ To have advanced knowledge on animal genetics, molecular biology and developmental biology and their applications
- ❖ To prepare the students for pursuing advance studies in various fields of animal's Sciences through research

In all **NINE questions are to be set and five questions are to be answered.** Question number 1 is compulsory of very short type (2 marks each) and includes 7 questions. Rest eight questions are to be set and examinees are required to answer **four** questions (long answer type 14 marks each) selecting not more than two from each group.

Paper consists of 60 credit hours

Foundation of Zoology : Group A

Animal Systematics and Evolution

- 1 Species and species concept.
- 2 Synthetic theory of Evolution
- 3 Molecular phylogeny – Construction of phylogenetic tree, Nucleic acid phylogeny – DNA – DNA hybridization, restriction enzyme site mapping technique, nucleotide sequence comparison.

Fundamentals of Histotechniques

- 4 Histochemistry
Histochemical stains: Histochemical identification and localization of the following:
 - i. Ninhydrin-Schiff reaction
 - ii. DNA by Feulgen reaction

Foundation of Zoology: Group-B

Tools and Techniques

- 5 Separation technique: Electrophoresis, Principles, types and applications PAGE and Agarose gel Electrophoresis
- 6 Microscopy, principle & applications: Electron microscope
- 7 Molecular biology techniques
 - b. Southern blotting
 - c. Northern blotting
 - d. Western blotting
- 8 Polymerase chain reaction (PCR)

Books Recommended

1. Dobzhansky Th. (1964): Genetics and the Origin of Species. Columbia.
2. Futuyma D. J. (1998): Evolutionary Biology. Sinauer
3. Kimura M. (1984): The Neutral Theory of Molecular Evolution. Cambridge.
4. Mayr E. (1966): Animal Species and Evolution. Belknap Press
5. Strickberger M. W. (2000): Evolution. Jones and Bartlett
6. Wilson and Walker Practical Biochemistry

7. Pearse, A.G.E.: Histochemistry; Theoretical and Applied (Vol. I, II & III), (4th ed.),
Churchill-Livingstones, 1980-1993
8. Staining methods Histologic and Histochemical, J F AMcMannus and Rubert W
Mowry, Harper and Row 1964

Paper 2 Animal Diversity (Non chordate and Chordate)

Time 3 Hours

FM 70

In all **NINE questions are to be set and five questions are to be answered**. Question number 1 is compulsory of very short type (2 marks each) and includes 7 questions. Rest eight questions are to be set and examinees are required to answer **four** questions (long answer 14 marks each) selecting not more than two from each group.

Paper consists of 60 credit hours

Animal Diversity: Group-A

1. Locomotion: Modern concept of Flagellar and Ciliary movement in protozoa
2. Nutrition and Digestion: Filter feeding in polychaeta.
3. Larval forms of crustacea
4. Miscellaneous topics
 - 4.1 Adaptive radiation in polychaetes
 - 4.2 Ancestral mollusc and derivation of different modern classes

Animal Diversity: Group-B

5. Geological time scale and fossil
6. Origin and evolution of Amphibia
7. Dinosaurs and their causes of extinction
8. Dentition in mammals
9. Primitive mammals:
 - 9.1 Prototheria
 - 9.2 Metatheria

Books Recommended

1. Boolootian, R. A. and Stiles, K. A., College Zoology, 10th edition, Macmillan Publishing Co., Inc. New York, 1981.
2. Colbert, E. H., Morales, M. and Minkoff, E. C. Colbert's Evolution of the Vertebrates: A history of the backboned animals through time, 5th edition, John Wiley - Liss, Inc., New York, 2002.
3. Goodrich, E. S., Studies on Structure and Development of Vertebrates, Dover Publication, New York, 1958.
4. Hildebrand, M. Analysis of Vertebrate Structure, 4th edition, John Wiley & Sons, Inc., New York, 1995.
5. Marshall, A. J., Biology and Comparative Physiology of Birds, Volume I & II, 1960.
6. McFarland, W. N., Pough, F. H., Cade, T. J. and Heiser, J. B., Vertebrate Life, Macmillan Publishing Co., Inc., New York, 1979.
7. Moore, J. A., Biology of Amphibia, Academic Press, 1964.
8. Parker, T. S. and Haswell, W. A., TextBook of Zoology, Vol. II, ELBS, 1978.
9. Romer, A. S. and Parsons, T. S., The vertebrate body, 6th edition, CBS Publishing Japan Ltd, 1986.
10. Sinha, A. K., Adhikari, S. and Ganguli, B. B.: Biology of Animals, Vol. II, New Central Book Agency, Calcutta, 1988.
11. Young, J. Z. The life of vertebrates, 3rd edition, ELBS with Oxford University Press, 1981
12. Vishwanath, Vertebrate Zoology

Semester – 1
Paper 3

ZOOC 03

Endocrinology and Developmental Biology

Time 3 Hours

FM 70

Paper consists of 60 credit hours

In all **NINE questions are to be set and five questions are to be answered**. Question number 1 is compulsory of very short type (2 marks each) and includes 7 questions of fill in the blanks/one word answer, /true /false type. Rest eight questions are to be set and examinees are required to answer **four** questions (long answer 14 marks each) selecting not more than two from each group.

Group-A Endocrinology

- 1 Hormones and mechanism of their action
- 2 Functions of the hormones secreted from – Hypothalamus (mammals only)
- 3 Biosynthesis and secretion of
 - 6.1 Amino acid derived hormone (T_3T_4)
 - 6.2 Biosynthesis of steroid hormones
- 4 Hormonal control of fuel metabolism: Insulin Glucagon Epinephrine
- 5 Gastrointestinal hormones and their regulation

Group- B Developmental Biology

- 6 Molecular events of fertilization and prevention of polyspermy.
- 7 *Caenorhabditis elegans* - Cell lineage and developmental events.
- 8 Cell differentiation:
 - 8.1 Myogenesis (skeletal muscle - formation, regeneration and hypertrophy)
 - 8.2 Haemopoetic Stem cells and their diversification
 - 8.3 Haemoglobin biosynthesis

Books Recommended

1. Human Embryology & Developmental Biology, 5E, Bruce M. Carlson, MD, PhD
Saunders, ISBN 978-1-4557-2794-0 (pbk.)
2. A Text Book of Histology, William Bloom and Don W Fawcett, Saunders
3. General and Comparative Physiology, William S Hoar, Prentice Hall of India, 2004
4. Developmental Biology, S F Gilbert_9e.
5. A Text Book of Medical Physiology, 11e, Arthur C Guyton
6. Principles of Anatomy and Physiology 12th Edition – Gerard J Tortora, Wiley 2009
7. Vander's Human Physiology: The Mechanisms of Body Function (13th edition)
McGraw Hill, ERIC P. WIDMAIER, HERSHEL RAFF, KEVIN T. STRANG

Books Recommended:

1. Alberts et al.: Molecular biology of the cell. Garland, 2002.
2. Gilbert: Developmental biology. Sinauers, 2003.
3. Kalthoff: Analysis of biological development. McGraw-Hill, 1996.
4. Wolpert: Principles of development. Oxford, 2002.
5. Molecular Biology of the Gene, Watson
6. Molecular Cell Biology, Lodish, Berk, Zipursky, Matsudaira, Baltimore, Darnell

Books Recommended

1. Hadley: Endocrinology, Prentice hall. International Edition. 2000
2. Norris: Vertebrate Endocrinology (2nd ed). Lea &Febriger. 1997
3. Brooks and Marshall: Essentials of Endocrinology, Blackwell Science. 1995
4. Turner and Bagnara: General Endocrinology, W. B. Saunders Company Philadelphia. 1984
5. Larson: Williams Text Book of Endocrinology, 10th edition. W. B. Saunders Company, Philadelphia. 2002.

Semester I
Full Marks-70

Paper IV Practical
Time 6 Hours

ZOOP 04

Practicals

Marks distribution

1. Dissection:		6X2=12
a. Vertebrate	06	
b. Invertebrate	06	
2. Slide preparation		04
3. Spotting	2X10=	20
a. Slides (04)	2X4=08	
b. Museum Specimens (04)	2X4=08	
c. Bones (02)	2X2=04	
4. Reproductive Physiology & Endocrinology		5X2=10
a. Reproductive physiology	05	
b. Endocrinology	05	
5. Systematics and Evolution		04
6. Class record, poster/models/collection		10
7. <i>viva-voce</i>		10

List of Practical

1. A. Dissection:
 - 1.-Local bony fish- Afferent, Efferent and cranial nervous system
 2. Earthworm –Nerve ring, Reproductive system and digestive systemB. Slide preparation- Gemmule of sponge, Obelia colony, Statocyst of prawn, ovary of earthworm, Daphnia, placoid and cycloid scale.
2. Museum Specimens- Euspongia, Physalia, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Limulus, Octopus, Loligo, sepia, Echinus, Asterias, Holothuria, Exocoetus, Hyla, Rachophorous, Draco, Phrynosoma, Bat
3. Permanent Slides: Invertebrate and Mammals (General histology, reproductive organs and endocrine glands.
4. Bones: Mammals, Different types of Teeth of mammals
5. Bio-Systematic and Population genetics
 3. Estimation of gene and genotype frequency in human population.