VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE WITH ZOOLOGY

(MULTIDISCIPLINARY STUDIES)

3-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023 & NEP, 2020

Vidyasagar University

B.SC. IN LIFE SCIENCES WITH ZOOLOGY

3-Year Bachelor Degree Programme in Multidisciplinary Studies

(Draft Syllabus)

YEAR	SEMESTER	Code	Name of the Subject	Credit	Remark
I	**SEMESTER I or SEMESTER II**	MJ-A1/ MJ-B1	***Diversity of Animal world***	3(T)+1(P) = 4	Major ***(To be studied by the students taken Zoology as Discipline-A/ B)***
	SEMESTER I	MI-01/ C1-01	***Animal diversity***	3(T)+1(P) = 4	Minor ***(To be studied by the students taken Zoology as Discipline- C)***
		SEC -1	***To be chosen from SEC-01 of Discipline A/B/C of their Hons. prog.***	3(P)	Skill Enhancement course
	SEMESTER II	MI-02/ C1-02	***Insect vector & disease***	3(T)+1(P) = 4	Minor ***To be studied by the students taken Zoology as Discipline- C)***
		SEC -2	***To be chosen from SEC-01 of Discipline A/B/C of their Hons. prog.***	3(P)	Skill Enhancement course

PROGRAMME OBJECTIVE

The course guides Bachelor's applicants through the incredible diversity of living forms, from simple to complex. It explains how each group of organisms originated and how they established themselves in the environment with their unique traits. In addition, it addresses the differences and similarities between organisms based on their morphology and anatomy, which led to their classification into taxa and clades.

MAJOR (MJ)

(MJ-A1/B1): DIVERSITY OF LIVING WORLD

About the course

The course compares various non-chordate taxa in great detail. It also highlights how the complexity of structure and function increases along the taxonomic hierarchy. Thus, the course provides an overview of the complex life processes and adaptive radiations of non-chordates.

Learning outcomes

After successfully completing this course, the students will be able to:

- Develop understanding on the diversity of life with regard to protists, non-chordates and chordates.
- Group animals on the basis of their morphological characteristics/ structures.
- Develop critical understanding how animals changed from a primitive cell to a collection of simple cells to form a complex body plan.
- Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.
- Understand how morphological change due to change in environment helps drive evolution over a long period of time.
- In addition to improving their writing skills, the project assignment will provide them with a taste of research so they can discover the process involved in studying biodiversity and taxonomy. Students will be able to think and interpret independently due to the selection of various animal species.

MJA1/B1T: Diversity of Animal world **Credits 03**

Course Contents:	**Hours**
Unit 1.Animal architecture & the Bauplan concept Origin of life on Earth: Arrival of simple form from primordial chemicals Complexity of Life: Origin of metazoans; Concept of Cellularity, Body symmetry, Germ layers & Body cavities Sequence & strategies of life cycle: Concept of classification of life cycles, adaptations & relationship between ontogeny & phylogeny	7hrs
Unit 2. Basics of systematics & classification Definition, relationship & utility of Systematics, Taxonomy & Evolution Concept of Biological Classification & Nomenclature, Hierarchical categories recognized by ICZN; Zoological Nomenclature – principles & codes; Six kingdom classification Concept of species & clade	7hrs
Unit 3. Protists General characteristics and classification of subkingdom Protozoa upto phyla (Levine et.al, 1981) Type study: *Plasmodium*	5hrs
Unit 4. Diversity in nonchordates General characteristics and classification upto classes: Porifera, Cnidaria, Ctenophora, & Platyhelminthes (Rupert & Barnes, 1994) Special features & structural diversity in sponges with special reference to cell types Special features of cnidarians with reference to polymorphism and division of labour; Reef forming corals & coral reefs Affinity of Ctenophora Basic organizations with reference to adaptive radiation in flatworm & roundworms General characteristics and classification of Annelida, Arthropoda, Mollusca &	16 hrs

Echinodermata upto class (Rupert & Barnes, 1994) Basic organization & diversity in annelids with special reference to metamerism General characteristics & affinity of Onychophora The emergence of arthropods: Concept of haemocoel; tagmatisation& ecdysis; Adaptive radiations in Crustacea, Chelicerata &Insecta; Basic idea of fossil arthropod - Trilobita& Myriapoda (structural details and phylogeny not needed) Basic organization and diversity in Mollusca with reference to torsion in gastropoda Affinity of Echinodermata **Unit 5. Diversity in Hemichordata&lower Chordates** Characteristics features of Phylum Hemichordata& Chordata; Concept of Protochordta; Evolutionary status & affinities of Hemichordata **Unit 6. Diversity in vertebrates** Advantages of vertebrates over protochordates & amniotes over anamniotes Classification of Chondrichthyes & Osteichthyes upto subclasses (Romer 1959) General organization of Dipnoi Classification of Amphibia upto order (Duellman & Trueb, 1986) Emergence of land vertebrates Classification of Reptilia upto living order, Aves upto subclasses & Mammalia upto living order (Young, 1981) Features of venomous & non venomous snake, distribution & type of snake venom in India Origin of Birds; Features of living running & flying birds Special features of Monotremes&Marsupials with evolutionary significance; Features of living primates Concept of aquatic, volant,arboreal, cursorial, fossorial adaptations Type study: *Cavia*	5hrs 16hrs

Recommended readings

- Barnes, R. S. K.; Calow, P.; Olive, P. J. W.; Golding, D. W.; Spicer, J. I. (2002) The Invertebrates: a Synthesis, Blackwell Publishing.
- Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
- Bushbaum, R. (1964) Animals without Backbones. University of Chicago Press.
- Brusca R.C and Brusca G.J. (2003). Invertebrates, 2nd ed. Sinauer Associates
- Chaki K.K., Kundu G. and Sarkar S. (2011). General Zoology, 4th ed. New Central Book agency
- Ganguly B., Sinha, A.K., Adhikari S. (2011). Biology of Animals, Vol. I. NCBA
- Hickman, C.; Roberts, L.S.; Keen, S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
- Holland, P. (2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
- Kardong, K.V. (2006) Vertebrates: Comparative Anatomy, Function, Evolution (4th edition), McGraw- Hill.
- Kapoor V.C. (2008). Theory & practice of animal taxonomy. Oxford & IBH.
- Marshall, A.J and Williams, W.D. (1988) Text book of Zoology-Invertebrates. VII Ed., Vol. II, CBS Publishers
- Romer, A.S. and Parsons, T.S. (1986). The vertebrate body. 6th edition. Saunders.
- Young, J.Z. (2004). The life of vertebrates, 3rd edition, Oxford University Press

MJA1/B1P: Practical **Credits 01**

1. Basic requirements for laboratory work: Knowledge about the parts of microscope with their function & setting of microscope
2. Idea of fixatives & preservatives for preparation to study the museum specimen
3. Study of animals through identification of models, photographs, slides and museum specimens in the laboratory with details on their classification

uptophylum/class/subclass/order as indicated in theory, along with biogeography, adaptive features, economic/medical/ecological importance and diagnostic features :

- ✓ *Amoeba, Euglena, Paramoecium, Plasmodium, Entamoeba, Elphidium, Opalina* (at least 5)
- ✓ *Sycon, Euspongia* (bath sponge), Neptune's cup, (at least 1)
- ✓ *Obelia, Hydra, Aurelia, Physalia, Porpita, Coral,* Sea anemone, Sea pen,*Beroe* (at least 5)
- ✓ *Fasciola, Teania, Ascaris* (at least 2)
- ✓ *Nereis, Aphrodite,* Leech, *Tubifex*, Earthworm (at least 3)
- ✓ *Carcinoscorpius,* Scorpion, *Balanus,* Crab, *Macrobrachium, Penaeus, Squilla, Eupagurus, Scolopendra, Julus,* Termite queen,Silkmoth, Honey bee (three casts), *Sitophilus, Tribolium,* Lady bird beetle, Locust, Grasshopper, Dragon fly, Stick insect, Mosquito, *Lepisma, Belostoma, Daphnia, Cyclops, Argulus, Peripatus* (at least 10)
- ✓ *Chiton, Achatina, Aplysia, Dentalium,* Oyster, Mussel, *Sepia, Loligo, Octopus* (at least 5)
- ✓ Sea star, Brittle star, *Antedon,* Sea cucumber, *Echinus* (at least 2)
- ✓ *Balanoglossus, Ascidia, Branchiostoma, Myxine, Petromyzon*
- ✓ *Scoliodon, Sphyrna, Trigon, Torpedo, Labeorohita, Catla catla, Heteropneustes, Clarias, Exocoetus, Anabas,* Sucker fish, Flat fish, *Hippocampus*(at least 8)
- ✓ *Uraeotyphlus, Ichthyophis, Necturus, Cryptobranchus, Tylototriton, Hyla, Rhachophorus* (at least 5)
- ✓ *Chelone, Trionyx, Hemidactylus, Varanus, Calotes, Mabuya, Gekko, Chameleo, Draco, Phrynosoma, Ophiosaurus, Bungurus, Naja,Daboia, Amphiesma, Zamenis(Ptyas), Natrix, Hydrophis, Crocodylus, Gavialis* (at least 8)
- ✓ *Pistaculla, Passer,* Kingfisher, *Spilopelia (*spotted dove*), Milvus(kite),Black Cormorant, Cacatua, Ploceus, Orthotomus, Copsychus* (oriental magpie)*Coppersmith Barbet (at least 5)*
- ✓ *Bandicota, Hystrix, Funambulus, Pteropus, Manis, Cavia, Lemur* (at least 2)

4. Study of animals in nature – Concept of the use of photographic device, sound recorder, GPS & binocular through demonstration or handling; Observation & records of different animals from college campus or nearby any terrestrial field (forest, grassland, hill or mountain area etc.) or water body (pond, river, lake, sea etc.) or zoological park or museum
3. Preparation of key for identification of venomous and non-venomous snakes; Preparation of key on any group (preferably insects, fishes & birds) of different feeding habit – all in form of animal album with photographs & necessary information
5. Assessment of relationship by constructing a cladogram using any five animals belonging to a clade; Comparison & weighting of characters of any two species of animal belonging to same genera or different genera but same family

MINOR (MI)

MI-1/C1: Same as Minor-1 (ZOOSMI01) of Zoology (Hons) programme **Credits 04**
FM: 75

MI-2/C2: Same as Minor-2 (ZOOMI02) of Zoology (Hons) programme **Credits 04**
FM: 75

SKILL ENHANCEMENT COURSE (SEC)

TO BE CHOSEN FROM THE BUCKET OF SECs OF SELECTED DISCIPLINE A/B/C
(As per A/B/C Hons. Prog. Syllabus)