

Deccan Education Society's
Kirti M. Doongursee College of Arts, Science and
Commerce (AUTONOMOUS)
Dadar (W), Mumbai -28



Affiliated to
UNIVERSITY OF MUMBAI

Title of the program

- A- U.G. Certificate in Zoology**
- B- U.G. Diploma in Zoology**
- C- B.Sc (Zoology)**

Syllabus for
Semester – Sem I & II

Ref: GR dated 20th April, 2023 for Credit Structure
of UG

(With effect from the academic year 2026-27 Progressively)

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.

PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PROGRAM SPECIFIC OUTCOMES

PSO	Description
PSO1	Explain the fundamental life processes in animals.
PSO 2	Analyze interactions between organisms and their environments
PSO 3	Work in groups and find sustainable solutions for wildlife conservation
PSO 4	Execute field techniques for environmental monitoring

Sr. No.	Heading	Particulars	
1	Title of program O: _____A	A	U.G. Certificate in Zoology
	O: _____B	B	U.G. Diploma in Zoology
	O: _____C	C	B.Sc. (Zoology)
2	Eligibility O: _____A	A	H.SC.(Science) OR Passed Equivalent Academic Level 4.0
	O: _____B	B	Under Graduate Certificate in Zoology OR Passed Equivalent Academic Level 4.5
	O: _____C	C	Under Graduate Diploma in Zoology Passed Equivalent Academic Level 5.0
3	Durati on of progra m R: _____	A	One Year

		B	Two Years
		C	Three Years
4	Intake Capacity R: _____	120	

**Sign of the HOD &
Coordinator**

BOS in Zoology

**Sign of the NEP Coordinator,
DES's Kirti M. Doongursee
College**

Sign of Principal

**DES's Kirti M.
Doongursee College,
Mumbai 28.**



Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce
(AUTONOMOUS)

Preamble

1) Introduction

The FYBSc Zoology syllabus(Under Graduate Certificate in Zoology) is designed as per the objectives and guidelines of National Education Policy 2020. This programme is designed to provide a basic understanding of the principles of life processes, ecology and environment , laboratory techniques through an academic curriculum of theory and practical courses along with entrepreneurship skills development. We aim to provide not only subject knowledge but also make the learners understand the core values of the Zoology. This syllabus is framed to equip learners with a basic theoretical and practical knowledge for developing analytical abilities for problem solving, exploring opportunities, and also to develop entrepreneurship skills. There will be continuous evaluation of learners based on both practical skills and theoretical / mental abilities through class tests, group engagement and assignments.

2) Aims and Objectives

The aims and objectives of the FYBSc Zoology (Under Graduate Certificate in Zoology) curriculum is to provide learners with a basic understanding of the principles of life processes, ecology, Biodiversity laboratory techniques, developing applications of knowledge Zoology for academic and entrepreneurial pursuits. The aims and objectives align with broader educational goals, focusing on academic and professional goals . The syllabus aims in imparting knowledge related to animal sciences, current trends and advancements in the field to develop entrepreneurial aptitude and skills with special reference to Aquarium fish keeping and Marine entrepreneurship.

3) Learning Outcomes

The learners will develop an understanding of fundamental principles of life processes, ecological interactions , biodiversity, acquire laboratory skills for applications in allied industries, research, and academia. The learners will develop an aptitude for exploring the opportunities for self-employment and entrepreneurship activities in marine entrepreneurship.

4) Any other point (if any)

The skills and knowledge acquired through this programme will make the learners well-equipped for exploring the diverse fields of Zoology and applying them to entrepreneurial activities or higher academic pursuits.

Semester I	Course Code	Course Title	Vertical	Credit
	26 ZOO MJ 1 1 1	Life Processes-I and II	Major	2
	26 ZOO MJ P 1 1	Practical based on Life processes	Practical	2
	26 ZOO OE 1 3 1	Biodiversity Conservation and Sustainable development	OE1	2
	26 ZOO OE 1 3 2	Nutrition - deficiency and Lifestyle diseases	OE2	2
	26 ZOO VSC 1 4 1	Aquarium Fish Keeping	VSC	2
	26 ZOO SE 1 5 1	Introduction to Marine Biodiversity	SEC	2
Semester II	Course Code	Course Title	Vertical	Credit
	26 ZOO MJ 2 1 1	Ecology and Biodiversity	Major	2
	26 ZOO MJ P 2 1	Practical based on Ecology and Biodiversity	Practical	2
	26 ZOO OE 2 3 1	Vector borne disease & its management	OE1	2
	26 ZOO OE 2 3 2	Global Climate Issues & International summits, agreements	OE2	2

	26 ZOO VSC 2 4 1	Value added products from sea	VSC	
	26 ZOO SE 2 5 1	Marine Entrepreneurship	SEC	2

Course Code	MAJOR SEM – I - Major Paper I	Credits	Lectures/W eek
26 ZOO MJ 1 1 1	Life Processes-I and II	2	2
Course Objectives(CO): CO1. To Recall various terms of life processes including locomotion, respiration, reproduction, excretion, circulation, and nutrition. CO2. To Understand coordination in life processes of the living organism. CO3. To Apply detailed knowledge to explain the processes by which organisms develop, move, breath and excrete. CO4. To Analyse how various physiological processes happens in different animals.			
Course Outcomes (OC): (List the course outcomes) The student will be able to OC1.Highlight on life processes including locomotion, respiration, reproduction, excretion, circulation, and nutrition. OC2. Describe the co-ordination of physiological processes in organisms, including transport systems and responses to stimuli OC3.Apply detailed knowledge to explain the processes by which organisms develop, move, breath and excrete. OC4. Analyse how various physiological processes happens in different animals.			
Unit	Topics	No of Lectures	

1.1 Movement and locomotion

1.1.1 Amoeboid movement, tube feet, flagellum

1.1.2 : Ultra-structure of cilia and ciliary movements

: Action of muscles (Role of muscles in movement)

1.2 Nutrition

1.2.1 Types of nutrition: Autotrophic and Heterotrophic.

1.2.2. Apparatus for nutrition:

1.2.2.1 Animals without alimentary canal, ex. Amoeba

1.2.2.2. Animals with incomplete alimentary canal, ex. Hydra,

1.2.2.3. Animals with complete alimentary canal, ex.
ruminants and non-ruminants

1.2.3 Brief account of physiology of digestion in vertebrates and
symbiotic digestion in Ruminants.

1.2.4 Physiology of digestion in man

1.3 Respiration

1.3.1 Aerobic and anaerobic respiration

1.3.2 Types of respiratory surfaces:

1.3.2.1 General body surface: Cell membrane - ex. Amoeba,

1.3.2.2 Skin - ex. Earthworm and Frog

1.3.2.3 Trachea and spiracles,

1.3.2.4 Gills of fish,

1.3.2.5 Accessory respiratory organ in Fish,

Lungs of Human. Physiology of respiration in human

1.4 Circulation

1.4.1 Types of circulating fluids:

1.4.1.1 Water,

1.4.1.2 Coelomic fluid,

1.4.1.3 Lymph and

1.4.1.4 Blood

1.4.2 Types of circulation

1.4.2.1 Protoplasmic streaming,

1.4.2.2 open and closed circulation,

1.4.2.3 single and double circulation.

1.4.3 Hearts Types,

	1.4.3.1 Heart in Daphnia, 1.4.3.2 Heart of Cockroach Heart in chordates (2, 3 and 4 chambered heart)	
II	Unit II - Life Processes-II 2.1 Excretion and osmoregulation 2.1.1 Concepts of osmoregulation and excretion. Categorization of animals on the basis of principle nitrogenous excretory products. 2.2 Control and Coordination 2.2.1 Irritability in Paramecium 2.2.2 Structure of neuron, 2.2.3 Conduction of nerve impulse 2.2.3.1 Resting potential, 2.2.3.2 Action potential , Synaptic transmission 2.2.3.3 Refractory period. 2.2.4 Endocrine regulation: 2.2.4.1 Hormones as chemical messengers, Feedback mechanisms. 2.3 Reproduction 2.3.1 Asexual Reproduction: 2.3.1.1 Binary fission in Paramecium, 2.3.1.2. Gemmule in Sponges, 2.3.1.3. Budding in Hydra, 2.3.1.4. Regeneration in planaria, 2.3.2 Sexual mode of reproduction 2.3.2.1 Gametogenesis, 2.3.2.2 structures of Mammalian Ovum Structure of Mammalian Spermatozoa 2.4 Fertilization: 2.4.1 External and internal fertilization 2.4.2 Oviparity, 2.4.3. Viviparity 2.4.4 Ovo-viviparity	15

Reference Books

1. Campbell Biology, 11th Ed. (2017) Lisa Urry et al. Pearson Publication. ISBN. 978-0134093413
2. Biology (1994) by John W. Kimball, 6th Ed. ISBN. 978-0697142573
3. Invertebrate Zoology: A functional and evolutionary approach. 7th Ed. (2006) Robert D Barns. ISBN: 978-8131501047.
4. Modern Textbook of Zoology Vertebrates. (2020) 4th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-9350780954
5. Modern Textbook of Zoology Invertebrates (2020) 12th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-8193887554.
6. Embryology (2017) Mohan P Arora. Himalaya Publishing House. ISBN: 978-9352730964.

ADD E-BOOKS web links

Course Code	Practical Major 1	Credits	Lecture s/Week
26 ZOO MJ P 1 1	Practical based on Zoology Major (Life procsses)	2	2
Course Objectives (CO): CO1. To upgrade the skill in handling of basic laboratory instruments. CO2. To enhance learners' skills in calibration of instruments and calculation techniques. CO3. To upgrade the skill of learners in minimization of Error minimization in the laboratory. CO4. To upgrade the skill good laboratory practices.			
Course Outcomes (OC): Upon completion of the course, the learners should be able to: OC1. Safely practice, basic laboratory procedures and protocols inside a laboratory OC2. Acquire the skills of basic calibration and handling of instrumentation in laboratory. OC3. Appreciate the basics of life process in animals and their coordination in animal body. OC4. Acquire skills for preparation of various solutions required in experimental research.			

Unit	Topics	No of Lectures
I	1. Study of <i>Paramoecium</i> culture to observe food vacuole, contractile vacuole and ciliary movement. 2. Study of nutritional apparatus: Amoeba, L.S. of Hydra, Digestive system of Cockroach, Fish, Bird, and Mammals (ruminant and non-ruminant). 3. Study of effect of pH and temperature on amylase/ trypsin activity. 4. Study of heart of Cockroach, Fish, Frog, <i>Calotes</i>, Crocodile and Mammal. 5. Excretory apparatus in Amoeba, Planaria, Earthworm, Cockroach and Fish, Mammal. 6. Study of Reproductive structure in Ameoba, Hydra, Planaria, Cockroach, Mammals (T.S Testes and T.S ovary). 7. Study of respiratory apparatus in Amoeba, Cockroach, Spider, Fish and Frog, Mammal. 8. Introduction to basic laboratory safety practices, precautions and safety rules and symbols. 9. Use of Fire extinguisher, 10. Precaution and first aid for acid burn, 11. Precaution and first aid of chemical inhalation and the accident 12. Study of compound microscope, care and functions of its components, 13. Handling of common laboratory equipment (instrument and glassware): burner, autoclave, burette, and pipette (analytical and serological. 14. Handling of weighing Balance and preparation of solution of different concentration (Percentage, ppm, molarity, normality). 15. Packaging and autoclaving of test tubes, pipettes, Petri plates, and conical flask. 16. Measurement of pH of Milk, aerated drinks, Lemon juice, etc. using pH paper and pH meter. 17. Demonstration of aseptic transfer of liquids between burners.	60

	18. Visit to clinical lab/ pathology lab, OR Central Instrumentation facility OR R & D center, and submission of report OR Participation in an Instrumentation workshop. 19. Additional practical as per the facility available.	
Reference Books 1. A course in electronic measurements and instrumentation. (2015) A K Sawhney Dhanpat Rai and Co. Pvt Ltd. ISBN: 978-8177001006 2. Wilson And Walker's Principles And Techniques Of Biochemistry And Molecular Biology. 8th Ed. ISBN: 978-1316614761. 3. An Introduction to Practical Biochemistry. (2017) David Plummer. 3rd Ed. McGraw Hill Education. ISBN: 978-0070994874. 4. Bioinstrumentation. (2019) Bhawana Pandey and MH Fulekar. Dreamtech Press ISBN: 978-9389520286. 5. Guidelines for good laboratory practices-Indian council of medical research, New Delhi (2008). 7. Invertebrate Zoology: A functional and evolutionary approach. 7th Ed. (2006) Robert D Barns. ISBN: 978-8131501047. 8. Modern Textbook of Zoology Vertebrates. (2020) 4th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-9350780954 9. Modern Textbook of Zoology Invertebrates (2020) 12th Ed. R L Kotpal. Rastogi Publication. ISBN: 978-8193887554. 10. Embryology (2017) Mohan P Arora. Himalaya Publishing House. ISBN: 978-9352730964. 11. Comparative anatomy of vertebrates (2008) R. K. Saxena, Sumitra Saxena. ISBN: 978-1905740994.		

Course Code	OPEN ELECTIVE SEM – I - Course Title	Credits	Lecture s/Week
26 ZOO OE 1 3 1	Biodiversity Conservation and Sustainable development	2	2

Course Objectives (CO):

CO1. Recall outline of various terms, goals, concepts and theories with respect to biodiversity conservation and sustainable development

CO2. Understand the environment and importance of bio diversity and Learn about the judicious utilisation of natural resources

CO3. Apply the concept of green technology and the eco-friendly practices and other prospects of environment protection and reduce the biodiversity loss.

CO4. Analyse various anthropogenic activities and regulatory provisions in the context of environment and sustainable development .

Course Outcomes (OC):

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

OC1: Outline various terms, goals, concepts and theories with respect to biodiversity conservation and sustainable development

OC2: Develop understanding for the environment and importance of bio diversity and Learn about the judicious utilisation of natural resources

OC3: Use the concept of green technology and the eco-friendly practices and other prospects of environment protection and reduce the biodiversity loss.

OC4: Evaluate various anthropogenic activities and regulatory provisions in the context of environment and sustainable development .

Unit	Topics	No of Lectures
I	Biodiversity Conservation 1.1: Introduction to Biodiversity : Definition, Concepts, Scope and Significance . 1.2: Levels of Biodiversity - Introduction to Genetic, Species and Ecosystem Biodiversity. 1.3: Introduction of Biodiversity Hotspots - (Western Ghats and Indo-Burma Border)	15

	1.4: Values of biodiversity - Direct and Indirect use value 1.5: Threats to Biodiversity - Habitat loss and Man-Wildlife conflict 1.6: Biodiversity conservation and management 1.6.1: Conservation strategies: insitu, ex-situ, National parks, Sanctuaries and Biosphere reserves. 1.6.2: Introduction to International efforts: Convention on Biological Diversity (CBD), International Union for Conservation of Nature and Natural Resources (IUCN), United Nations Environment Program - World Conservation Monitoring Centre (UNEP-WCMC) 1.6.3:-Invasive alien /exotic species	
II	Sustainable development Conceptual foundation of sustainability Sustainable Development Goals (SDGs) Biodiversity, climate change and Inequality India's role in global sustainability Environmental Policy, law and Governance International agreements 2.1 Sustainable Development; Brundlandt Report. 2.2 Biosafety of GMOs and LMOs. 2.3 Environmental movements. Public awareness of Environment problems. 2.4 Role of Government, NGO's, Ecological footprint, International treaties and conventions. organizations, International efforts (Vienna Convention, Montreal Protocol, UNFCCC, Kyoto Protocol, Copenhagen Summit, etc.; IPCC; Environmental laws and acts. 2.5 National Environmental Policy. NBPGR, BSI, ZSI, WWF, IUCN, Convention on Biological diversity; Ramsar Convention, other conservation efforts.	15
References:- 1. Joseph, B. (2008) Environmental studies, Tata McGraw Hill. 2. Miller, G.T. (2002). Sustaining the earth, an integrated approach. (5th edition) Books/Cole, Thompson Learning, Inc. 3. Chapman, J.L. and Reiss, M.J. (1999). Ecology: Principles and applications (2nd edition) Cambridge University Press.		

4. Ghosh, S.K. and Singh, R. (2003). Social forestry and Forest Management. Global Vision Pub.

Course Code	OPEN ELECTIVE SEM – I - Course Title	Credits	Lectures /Week
26 ZOO OE 13 2	Nutrition - deficiency and Lifestyle diseases	2	2
Course Objectives (CO): CO1. Recall terms, concepts with respect to nutrition, dietary requirements and deficiency disorders . CO2. Understand the role of food and nutrients in health and disease and knowing culturally competent nutrition requirements for diverse individuals. CO3. Apply the knowledge to maintain holistic health and wellbeing . CO4. Analyse the effect of addictions and unhealthy lifestyle on mental and physical wellbeing.			
Course Outcomes: At the end of the course the students will be able to- OC1: Highlight terms, concepts with respect to nutrition, dietary requirements and deficiency disorders . OC2: Understand the role of food and nutrients in health and disease and knowing culturally competent nutrition requirements for diverse individuals. OC3: Applying the knowledge to maintain holistic health and wellbeing .			

OC4:Analyze the effect of addictions and unhealthy lifestyle on mental and physical wellbeing.

Unit	Topics	No of Lectures
I	Nutrition 1.1 Basic concept of Food: Components and nutrients –Macronutrient-Carbohydrates, Lipids, Proteins-,Micro nutrients – Vitamins and Minerals. (Biological functions) 1.2 Concept of balanced diet, nutrient requirements and dietary pattern for different groups viz., adults, pregnant and nursing mothers, infants, school children, adolescents and elderly people. 1.3 Definition and concept of health (WHO), Physical and Mental health 1.4 Food hygiene: Potable water- sources and methods of purification at domestic level.	15
II	Nutrient deficiency and Lifestyle diseases 2.1 Common nutritional deficiency diseases- Protein Malnutrition (e.g., Kwashiorkor and Marasmus), 2.2 Vitamin A deficiency, Iron deficiency and Iodine deficiency disorders, Vitamin D deficiency disorder their symptoms, treatment, prevention 2.3 Life style dependent diseases- hypertension, diabetes mellitus, and obesity their causes and prevention. 2.4 Social health problems- smoking, alcoholism, narcotics.	15

References :

1. Mudambi, S.R. and Rajagopal, M.V. (2007). Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Ed;; New Age International Publishers
2. Srilakshmi, B. (2002). Nutrition Science; New Age International (P) Ltd.
3. Srilakshmi, B. (2007). Food Science; Fourth Ed; New Age International (P) Ltd.
4. Swaminathan, M. (1986). Handbook of Foods and Nutrition; Fifth Ed; BAPPCO.
5. Bamji, M.S.; Rao, N.P. and Reddy, V. (2009). Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd.
6. Wardlaw, G.M. and Hampl, J.S. (2007). Perspectives in Nutrition; Seventh Ed; McGraw Hill.

7. Lakra, P. and Singh M.D. (2008). Textbook of Nutrition and Health; First Ed; Academic Excellence.
8. Manay, M.S. and Shadaksharaswamy, M. (1998). Food-Facts and Principles; New Age International (P) Ltd.
9. Gibney, M.J. et al. (2004). Public Health Nutrition; Blackwell Publishing.
10. Ebooks web links

Course Code	VOCATIONAL SKILL COURSE SEM – I - Course Title	Credits	Lectures/Week
26 ZOO VSC 1 4 1	Paper- I Aquarium Fish Keeping	2	2

Course Objectives(CO):

CO1. Recall to identify and understand the characteristics of different fish species commonly kept in aquariums. This includes knowledge of their natural habitats, behavior, diet, and compatibility with other species.

CO2. Understand the importance of maintaining optimal water quality in an aquarium.

CO3. Apply the knowledge gained for setting up and maintaining an aquarium. This includes knowledge of tank selection, filtration systems, lighting, heating, and appropriate decorations. They should understand the nitrogen cycle and the role of beneficial bacteria in maintaining water quality.

CO4. Analyse whether learners have a grasp of the dietary requirements of different fish species and disease prevention

Course Outcomes:

After successful completion of this course, students would be able to

OC1 :To identify and understand the characteristics of different fish species commonly kept in aquariums. This includes knowledge of their natural habitats, behavior, diet, and compatibility with other species.

OC2:Learners should understand the importance of maintaining optimal water quality in an aquarium.

OC3:Learners should be capable of setting up and maintaining an aquarium. This includes knowledge of tank selection, filtration systems, lighting, heating, and appropriate decorations. They should understand the nitrogen cycle and the role of beneficial bacteria in maintaining water quality.

OC4 :Learners should have a grasp of the dietary requirements of different fish species and disease prevention

Unit	Topics	No of Lectures
I	1. To study the accessories required to set up the tank 2. Setting up of fish tank - Fish feed, aeration, cleaning, light etc. 3. Estimation of Water parameters using Kit 4. Setting up of rearing and breeding tank 5. Setting up of Aquascape and Ornamental plants in the aquarium 6. Breeding set up for live bearers (Guppy, Swordtail , Molly) 7. Breeding set up of Egg bearers (Egg scatters goldfish, zebra fish, Egg depositors -Discus, Egg barriers- Killi fish, Mouth breeders- Arowana, Nest builders- Gourami, Siamese fighter) 8. Record behaviours (swimming patterns, schooling behaviour, changes in coloration, and interactions with other fish) in ornamental Fish. 9. Experiment: Study of separation of fries from parents 1. Selecting the Right Time 2. Using a Breeding Trap 3. Separate Tank or Nursery Tank 4. Using a Siphon 5. Providing Hiding Places in the Nursery Tank 6. Monitoring and Feeding 7. Gradual Introduction to Larger Tank 10. Study of diseases and its prevention during fish breeding. 11. Assignment on breeding of an ornamental fish species (e.g. Siamese fighter, guppy, etc.). 12. Visit to a fish breeding centre / facility / aquarium shop. 13. Feasibility report for setting up an ornamental fish breeding facility. 14. Case study - Hatchery and nursery management of ornamental fishes.	60

	15. Additional practical as per the facility available.	
References: - 1. Jameson J.D., and Santhanam R., Manual of Ornamental Fishes and Farming Technologies, Fisheries College and Research Institute, Tamilnadu Veterinary and Animal Sciences, Tuticorin, 1996 2. Felix S., Sundaraj V., and Thilakar S., Manual of Tropical Fish Diseases Diagnosis, Tamilnadu Veterinary and Animal Sciences University, Chennai, 1999. 3. Ramanathan N., and Francis T., Manual of Breeding and Larval Rearing of Cultivable Fishes, Tamilnadu Veterinary and Animal Sciences University, Chennai, 1996. 4. Santhanam,R. Sukumaran,N. and Natarajan,P Oxford and IBH Publishing Co pvt.NewDelhi 1990. 5. Pitman Publ. Ian C. 1984. Marketing in Fisheries and Aquaculture. Fishing News Books.		

Course Code	SKILL ENHANCEMENT COURSE SEM – I - Course Title	Credits	Lectures/Week
26 ZOO SE 1 5 1	Introduction to Marine Biodiversity	2	2
Course Objectives (CO): CO1. Recall and identify key marine ecological concepts and terminologies. CO2. Understand the classification of ecological subdivision of marine environment and various types of beaches along with it fauna CO3.Apply knowledge to check the quality of commercially important marine organism. CO4. Analyse the salinity of sea water by refractometer			

Course Outcomes:

After successful completion of this course, students would be able to

OC1: Recall and identify key marine ecological concepts and terminologies.

OC2: To understand classification of ecological subdivision of marine environment and various types of beaches along with its fauna

OC3: Applying knowledge to check the quality of commercially important marine organism.

OC4: To analyze the salinity of marine water by refractometer

Unit	Topics	No of Lectures
I	1. Introduction to Marine Biodiversity. 2. To study various types of Beaches Rocky, Sandy, Muddy shores with regards to Fauna. 3. To study foraminiferans shells 4. To study Ecological adaptations of intertidal zone organisms. 5. Ecological subdivision of marine ecosystem based on land water mass (neritic, benthic, pelagic) and based on light penetration (euphotic, dysphotic, aphotic). 6. Determination of salinity by refractometer. 7. Determination of pH of marine water by pH paper and Universal indicator. 8. To study the phytoplanktons and zooplanktons 9. Mounting of Zooplanktons 10. To study commercially important marine fishes wrt anatomical features (cartilaginous / bony), morphological features, freshness, costing, Shark, Bombay duck, Mackerel, Oil sardine, pomfret, Kolia dissumerie, Kingfish. 11. To study commercially important edible non Piscean resource organism. (Prawns, lobster, Crabs, Oysters, Clams, Mussels, Sepia.) 12. Visit to fish landing center/ fish market and submit the report. 13. Shore walk to different beaches and submission of reports 14. Additional practical as per facility available.	60

References :

1. Marine ecology by Nair and Thumphy
2. Mase janun gheuya (Marathi) by Dr .Vinay Deshmukh and Dr Nandini Deshmukh
3. Elements of Marine ecology by R.V.Tait.
4. Fishes by Mary Chandi
5. Fish products and value addition by S. Balasundari , G Raghu Santhanam,R. Sukumaran,N. and Natarajan,P Oxford and IBH Publishing Co. pvt.NewDelhi 1990.

Course Code	MAJOR SEM – II	Credits	Lectures/Week
26 ZOO MJ 2 1 1	Paper I Ecology and Biodiversity	2	2
Course Objectives (CO):			
CO1. To Recall the key ecological concepts such as ecosystems, food chains, energy flow, and biogeochemical cycles.			
CO2. To Understand the different levels of biodiversity (genetic, species, ecosystem) and evaluate their ecological and economic significance.			
CO3. To Apply knowledge gained to identify major threats to biodiversity (e.g., habitat loss, climate change, pollution) and propose suitable conservation methods.			
CO4. To Analyse the major threats to biodiversity (e.g., habitat loss, climate change, pollution) and propose suitable conservation methods.			

Course Outcomes (OC):

After completion of this course , student will be able to

OC1. Recall the key ecological concepts such as ecosystems, food chains, energy flow, and biogeochemical cycles.

OC2. Understand the different levels of biodiversity (genetic, species, ecosystem) and evaluate their ecological and economic significance.

OC3. Apply knowledge gained to identify major threats to biodiversity (e.g., habitat loss, climate change, pollution) and propose suitable conservation methods.

OC4. Analyse the major threats to biodiversity (e.g., habitat loss, climate change, pollution) and propose suitable conservation methods.

Unit-I	Topics	No of Lectures
	Ecology	15

1.1 Concepts of Ecology: Study of Environment, Hydrosphere, lithosphere and Biosphere, Community, Population, Types of Ecology Autecology and synecology.

1.2 Types of ecosystems: Aquatic (Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert)

1.2.1 Food chain: Detritus and grazing food chains, Food web, Energy flow through the ecosystem, Ecological pyramids: Number, Biomass, and Energy.

1.3 Population dynamics:

1.3.1 Density, Natality, Mortality, Fecundity, sex ratio, survivorship curves, age pyramid, dispersal and dispersion.

Exponential and logistic growth,

1.4 Study of Animal interactions

Positive and negative interaction

1.4.1 Competition: Interspecific and intraspecific (any two example);

1.4.2 Commensalism (remora fish on shark, Cattle egrets on livestock),

1.4.3. Mutualism (Termite and *Trichonympha*, bees and flowers, cleaning symbiosis in fish by prawns.

1.4.4 Parasitism (*Ascaris* and man, lice and humans), Prey predation (Lion and deer).

Ammensalism

Human animal conflicts (2 examples)

II	Biodiversity 2.1 Introduction to Biodiversity: Definition, Concepts, types, scope and Significance. 2.2 Value of Biodiversity: 2.2.1 Consumptive value, 2.2.2 Productive value, 2.2.3 Social value, 2.2.4. Ethical value, 2.2.5 Aesthetic value, 2.2.6 Option value. 2.3. Patterns of Biodiversity: 2.3.1 Latitudinal gradients, Longitudinal gradient 2.3.2 Species area relationship 2.4. Threats to Biodiversity Habitat loss and Man-Wildlife conflict , Alien species invasion , Co -Extinction 2.4.2 Biodiversity Conservation: 2.4.2.1 Species Conservation: <i>In-situ</i> and <i>Ex-situ</i> conservation , Habitat Conservation , Habitat restoration	15
----	--	----

References-

1. Fundamentals of Ecology, 5th Ed. (2004). Odum, E.P. and Barrett G. W. Publisher: Brooks/Cole. ISBN: 978-0534420666
2. Elements of Ecology. 9th International Edition (2014). Smith T. M. and Smith R. L. Benjamin Cummings publication
3. Wildlife Biology, An Indian Perspective (2017). Saha G.K. and Mazumdar S. PHI Learning Private Limited. ISBN: 978-8120353138
4. Ecology – Principle and application (1999) Chapman J. L. and Reiss M. J., Cambridge University press, Low priced edition. ISBN: 0521588022
5. Essentials of Ecology, 3rd edition (2011) G. Tyler and Miller Jr. Thompson Books. ISBN: 978-0538735377
6. Essentials of ecology and environmental sciences. 5th Ed. (2013) S. V. S. Rana. PHI publisher. ISBN: 978-8120347861
7. Biodiversity- (2000) K.C. Agarwal- Agro Botanica Publications
8. Zoology, 5th Ed. (1999). S. A. Miller and J. B. Harley, Tata McGraw hill. ISBN: 978-0071158107

Course Code	Practical Major Paper II	Credits	Lectures/Week
26 ZOO MJ P 2 1	Practical based on Zoology Major Biodiversity and Ecology	2	2
Course Objectives (CO): CO1. To Recall the concept the ectoparasites and endoparasites CO2. To Understand different mammalian fauna, avian fauna, and herpeto-fauna of India. CO3. To Apply the knowledge to calculate the population estimation CO4. To Analyse the dissolved oxygen , hardness of water .			

Course Outcomes (OC):

Upon completion of the course, the learners should be able to:

OC1. Recall the concept the ectoparasites and endoparasites

OC2. Understand different mammalian fauna, avian fauna, and herpeto-fauna of India.

OC3. Apply the knowledge to calculate the population estimation

OC4. Analyse the dissolved oxygen , hardness of water .

Unit	Topics	No of Lectures
I	1 Identification of mammalian fauna, avian fauna, and herpeto-fauna of India. 2 To study the various animal tracking system: Global Positioning System, Remote Sensing and Biotelemetry – Divide these practicals 3 Effect of climate change on biodiversity: Case study 4 Population estimation through Capture recapture method. 5 Study of r/k selection in <i>Catla catla</i>, <i>Hoplobatrachus tigrinus</i>, <i>Panthera leo</i>, <i>Canis lupus</i>, Olive Ridley and <i>Gyps indicus</i>. 6 Determination of hardness of water sample. 7 Determination of dissolved oxygen. 8 Determination of salinity of the water sample by Refractometer / Conductivity method. 9 Study of population dynamics, food chain food web: (Grassland, Forest, Desert and Aquatic). Remove 10 Study of animal interaction: Ectoparasite (Head Louse) and Endoparasite (Tape worm), Exo parasite (Bed Bug), mutualism (Clownfish and anemones/ hermit crab and anemone), commensalism (Sharks and Remora). Remove 11 Estimation of water holding capacity of given soil sample. Remove 12 Study of animal community structure by quadrat method (Field or Simulation). 13 Study of aquatic fauna and their ecological role; fresh water (Cladocera), Intertidal (Sea Star, Sea	15

	Anemone, Barnacles), deep sea (Coral, Squids, Sperm Whale) (pictures / diagrams only). Carbon sequestration of tree Green house gases (GHG's) accounting 14. Any other practical as per facility available.	
Reference Books 1. Biological Science, 3rd Ed. (2005) D.J. Taylor, N. P. O. Green, G. W. Stout. Cambridge University press, Low priced edition. ISBN: 978-0521684170 2. Animal Behaviour: Psychobiology, Ethology and Evolution (1999). David McFarland. Pearson Publication. ISBN: 978-0582327320 3. An introduction to animal behaviour, 6th edition – (2012) Aubrey Manning and M. S. Dawkins. Cambridge University press, ISBN: 978-0521165143. 4. National Geographic Vol. 193 (3) March 1998: Rise of life on Earth p. 54-81 5. Scientific American Oct. 1994: Origin of life on Earth p. 53-61. 6. Essentials of human genetics. 5th Ed. (2009) –M.L. Kothari, L.A. Mehta and S.S. Roychoudhary, University Press. SBN: 978-8173716478. 7. Essentials of Ecology, 3rd edition (2011) G. Tyler and Miller Jr. Thompson Books. ISBN: 978-0538735377 8. Biodiversity: An Introduction. (2004) 2nd Ed. Kevin J. Gaston & John I. Spicer . Blackwell Publishing. ISBN: 1-4051-1857-1. 9. Essentials of ecology and environmental sciences. 5th Ed. (2013) S. V. S. Rana. PHI publisher. ISBN: 978-8120347861 10. Strickberger's Evolution (2007) Monroe W. Strickberger, J. & B. Publication. ISBN: 978-0763700669. 11. National Parks of India. (2016) R.S. Bisht. Publication Division, Ministry of I & B Govt. India. eBook. 12. Indian National Parks. R. Pathak. ISBN: 978-8184200355. 13. Indian Wild life Sanctuaries and National parks (2013). By Prakash Chandra. Cyber Tech Publications. ISBN: 978-9350531914		

Code	OPEN ELECTIVE SEM – II - Course Title	Credits	Lectures/Week
26 ZOO OE 2 3 1	Paper I Vector borne disease & its management	2	2
Course Objectives (CO): CO1. Recall different vectors responsible for vector born diseases CO2. Understand the types of vectors, their adaptations and diseases CO3. Apply various strategies to manage the vectors population below threshold levels, public health importance. CO4. Analyse Consequences of these disease causing agents on population as whole.			
Course Outcomes: After successfully completing this course, the students will be able to: OC1: Identify the causative agents and control measures of many commonly occurring vector born diseases. OC2: Develop understanding about the types of vectors, their adaptations and diseases. OC3: Devise strategies to manage the vectors population below threshold levels, public health importance. OC4: Comprehend the consequences of these disease causing agents on population as whole.			
Unit	Topics	No of Lectures	
I	Vector borne diseases 1.1 Vectors -Brief introduction, 1.2 Types – Digenic and monogenic vectors 1.3 General characteristics and adaptations of vectors such as mosquitoes, flies, fleas, lice, bed bug 1.4 Mosquito borne Diseases – Malaria, Dengue, Filariasis, chikungunya	15	

	Flies borne disease – Diarrhoea and dysentery , typhoid Lice borne diseases – Typhus Bedbug borne diseases – Irritation and sleeplessness	
II	Vector borne disease Management 2.1Control of vector flies by screening, fly traps, electrocution, poison baits and outdoor residual sprays; 2.2Chemical control. Efficacy of synthetic pyrethroids, residual spray of insecticides, treated bed nets/curtains and fumigations 2.3 Biological control of mosquitoes by use of guppy. 2.4 Social awareness to reduce mosquito breeding grounds , maintaining hygiene and keeping surroundings clean – SAMIR SIR	15
Overview of human parasites and vectors – Introduction, definition of terms – parasites, host, carriers, parasitism, Importance of studying parasitic and vector borne diseases Types of parasites – Permanent &Temporary, Facultative & Obligate, Zoophilic & Anthrophilic, Ectoparasites and Endoparasites, Monogenetic & Digenetic - definition and 1 example each Classification of human parasites – Protozoa and Metazoa (Helminths and Arthropods) Helminths - Platyhelminthes (Trematoda and Cestoda) and Nematoda Arthropoda – Arachnida, Insecta Types of vectors – Biological (Active) and Mechanical (Passive)– definition and 2 examples each Host-parasite interactions – parasitism, commensalism and mutualism Host- vector interactions, Host-Parasite Interactions – Overview of host immune responses to parasitic infections, mechanisms of evasion of host immunity Major vector-borne diseases: malaria, dengue fever, Zika, Lyme disease and rat fever - Pathogenesis and clinical manifestations, treatment, and prophylaxis Epidemiology of Parasitic diseases – global distribution, factors influencing disease transmission – environmental, socioeconomic and behavioral factors; Impact of climate change and urbanization on disease epidemiology Public health implications and vector control measures (insecticide-treated bed nets, indoor residual spraying)		

The future of parasitology – Vaccine development and implementation, targeted therapy, vector control and surveillance, career opportunities (research scientist, public health specialist, vector control specialist, medical entomologist, epidemiologist, academic educator, consultant, wildlife biologist, pharmaceutical/biotechnology industry professional)

Indian Institutes specializing in Parasitology and Vector-borne diseases – NIMR (New Delhi), NIE (Chennai), NIV (Pune), VCRC (Puducherry), RMRC (Dibrugarh), ICMR-NITM (Belagavi), IIPH (Gandhinagar), NCDC (Delhi) – mention their role/contribution

References:-

1. Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK.
 2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK.
 3. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and other Insect Vector borne Diseases. Wiley-Blackwell. 107
 4. Belding, D.L. (1942). Textbook of Clinical Parasitology. Appleton-Century Co., Inc., New York.
- Roy, D.N. and Brown, A.W.A. (2004). Entomology. Biotech Books, Delhi

Course Code	OPEN ELECTIVE SEM – II - Course Title	Credits	Lectures/Week
26 ZOO OE 2 3 2	Paper II Global Climate Issues & International summits, agreements	2	2

Course Objectives (CO):

CO1. To recall various concepts and theories of global environmental issues

CO2. To understand the effects of green house gas increase in atmosphere.

CO3. To apply the knowledge of climate change in reducing emission at individual and society level.

CO4. To analyse Anthropogenic effects on global climate change.

Course Outcomes:

After completing this course, the student will be able to:

CO1: Recall the terms, concepts and theories of global environmental issues.

CO2: Understand the physical basis of green house gas effect on man and materials.

CO3: Implement the knowledge of climate change and its effect on reducing the emission of green house gases at individual level

CO4: Analyse the anthropogenic effects on global climate change.

Unit	Topics	No of Lectures
	Global Climate Issues	15
I	1.1 Global Environmental change issues. 1.2 Greenhouse gases and their sources; Greenhouse effect 1.3 Causes of depletion of ozone layer and consequences 1.4 Climate change: Effects of enhanced UV-B on plants, microbes, animals, human health and materials; global energy infrastructure and GHG emissions. 1.5 Acid rain, Eutrophication, El Niño and the Southern Oscillation -El Niño and its Effects	15
II	Unit II: International summits and agreements	15

- | | |
|---|--|
| <p>1.1 International efforts on climate change issues.</p> <p>1.2 Global efforts for mitigating ozone layer depletion.</p> <p>1.3 Climate modeling and climate change feedbacks.</p> <p>1.4 International Agreements: the United Nations Framework Convention on Climate Change, Kyoto Protocol, Paris Agreement.</p> <p>1.5 Integrated Assessment, Decisions under uncertainty: Abate now, or delay?</p> <p>1.6 Emissions budgets. –</p> | |
|---|--|

Global Environmental Issues

Environment and Environmental Problems (08) Basic concepts and issues, global environmental problems – ozone depletion, UV-B, greenhouse effect and acid rain due to anthropogenic activities, Fisheries depletion, Eutrophication, their impact and biotechnological approaches for management.

Environmental Pollution (10)

Environmental pollution - types of pollution, Air, water and land pollution. sources of pollution, measurement of pollution, fate of pollutants in the environment, Ocean acidification, Bioconcentration, bio/geomagnification.

Environmental Economics (10)

Environmental Economics: Basic concept; methods of evaluation; Economic growth, Gross National Productivity and the quality of life, Tragedy of Commons, Economics of Pollution control, Cost-benefit ratio and cost effectiveness analysis.

References :-

1. Adger, N.; Brown, K. and Conway, D. (2012). Global Environmental Change: Understanding the Human Dimensions. The National Academic Press.
2. Turekian, K.K. (1996). Global Environmental Change-Past, Present, and Future. PrenticeHall.
3. Matthew, R.A.; Barnett, J. and McDonald, B. (2009). Global Environmental Change and Human Security. MIT Press., USA.
4. Hester, R.E. and Harrison, R.M. (2002). Global Environmental Change. Royal Society of Chemistry.

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures/Week
26 ZOO VSC 2 4 1	Value added products from sea	2	2

Course Objectives (CO)

CO1: To highlight marine bioresources and their economic potential

CO2: To understand commercially important marine organisms (fish, crustaceans, molluscs, seaweeds) and their utilization in value-added products.

CO3: To apply knowledge of processing and preservation techniques & methods such as drying, freezing, fermentation, canning, and extraction used to enhance shelf life and market value of marine products.

CO4: To analyse the commercial success of diverse value-added marine products such as products like fish pickles, surimi, fish oil, chitin and chitosan, seaweed-based fertilizer), nutraceuticals, cosmetics, and pharmaceuticals.

Course Outcomes :

After completion of this course , students would be able to

CO1:Memorize the key steps involved in the processing and production of value-added products from the sea.

CO2:Explain the principles and techniques used in the production of value-added products, including extraction, purification, and preservation methods.

CO3:Apply quality control measures to ensure the safety, nutritional value, and sensory characteristics of value-added marine products.

CO4: Analyze consumer preferences and market trends to identify potential niche markets for value-added marine products.

Unit	Topics	No of Lectures
I	1. Selecting a fish and fish cleaning methodology Basic cleaning and storing procedure of fish: a. Scaling and requisites for scaling a fish. b. Cleaning a fish c. Gutting techniques d. Methods of head removal e. Filleting a fish f. Refrigerating a fish g. Waste disposal 2. Study of various economically important prawns 3. Preparations of fish / Prawn pickle. 4. Making of fish cutlet. 5. Making of crab / sea food soup 6. Making of fish Papad / Fish Amoti 7. Making of Fish balls / Fish Momo 8. Making of Crab Lolypop 9. Making of Fish nuggets / Fish fingers 10. Preparation of Jawla and larval prawn chutney. 11. Study of by products of fish. Fish oil, ising glass 12. Products from marine invertebrate shells waste - Chitin, chitosan, Calcium supplements 13. Survey of various commercially available fish / canned products. 14. Institutional visit - CIFE/ Fishery survey of India/ NIO Mumbai. 15. Survey of fish market/ Cold storage shops and report submission. 16. Preparation of Feasibility report on starting a small-scale fish value added processing unit. 17. Any other practical possible as per the facility available.	60
References : 1. Adcock D, Bradfield R, Halborg A & Ross C. 1995. Marketing Principles and Practice. Pitman Publ. 2. Ahvenainen, R. (Ed.) Novel Food Packaging Techniques, CRC Press, 2003. 3. Amarchand D & Varadharajan B. 1979. An Introduction to Marketing. Vikas Publ. 4. Athalye, A.S. (1992), Plastics in Packaging, Tata McGraw –Hill Publishing Co., New Delhi. 5. Bakker, M. (1986) The Wiley Encyclopedia of Packaging Technology, John Willey & Sons. Inc; New York.		

6. Balachandran KK. 2001. Post-Harvest Technology of Fish and Fish Products. Daya Publ.
- Balachandran K.K. Post Harvest Technology of Fish and Fishery Products
7. Brody J. Fishery Byproduct Technology
8. Chaston I. 1983. Marketing in Fisheries and Aquaculture. Fishing News Books.

Course Code	SKILL ENHANCEMENT COURSE SEM – II - Course Title	Credits	Lectures/Week
26 ZOO SE 2 5 1	Paper- I Marine Entrepreneurship -	2	2
Course Objectives (CO): CO1: Provide students with a scientific understanding of marine ecosystems, commercially important species, and the sustainable utilization of marine bioresources. CO2: To develop entrepreneurial awareness in the marine sector CO3: Familiarize students with business opportunities in areas such as aquaculture, mariculture, fisheries, marine biotechnology, and eco-tourism. CO4 :Facilitate field visits, case studies, and interactions with industry experts to understand practical challenges and opportunities in marine entrepreneurship.			
Course Outcomes : After successful completion of this course, students would be able to CO1:Memorize marine resource organism with entrepreneurship potential CO2:Understanding different procedures to make commercially important products. CO3:Applying knowledge to check the quality of commercially important marine organism. CO4:Analyze consumer preferences and market trends to identify various marine products			
Unit	Topics	No of Lectures	

I	1. Introduction to economically important marine fish with regards to basic morphological and anatomical features , freshness, costing etc (Mackerel, Bombay duck, pomfrets, <i>Kolia dussumeri</i>, Black pomfrets, King fish.) 2. Study of various economically important prawns, crabs and lobsters. 3. Study of different types of edible Mollusca. Bivalve, Sepia, Octopus, Oysters, Mussels. 4. Preparations of fish / Prawn pickle. 5. Making of fish cutlet. 6. Making of crab / sea food soup 7. Making of fish Papad / Fish Amoti 8. Making of Fish balls / Fish Momo 9. Making of Crab Lolypop 10. Making of Fish nuggets / Fish fingers 11. Preparation of Jawla and larval prawn chutney. 12. Shell jewellery designing. 13. Home décor articles made from shells. 14. Survey of fish market/ Cold storage shops and report submission. 15. Institutional Visit - CIFE /Fishery survey of India / NIO Mumbai 16. Any other practical as per availability of center.	60
---	---	----

References :

9. Adcock D, Bradfield R, Halborg A & Ross C. 1995. Marketing Principles and Practice. Pitman Publ.
10. Ahvenainen, R. (Ed.) Novel Food Packaging Techniques, CRC Press, 2003.
11. Amarchand D & Varadharajan B. 1979. An Introduction to Marketing. Vikas Publ.
12. Athalye, A.S. (1992), Plastics in Packaging, Tata McGraw –Hill Publishing Co., New Delhi.
13. Bakker, M. (1986) The Wiley Encyclopedia of Packaging Technology, John Willey & Sons. Inc; New York.
14. Balachandran KK. 2001. Post-Harvest Technology of Fish and Fish Products. Daya Publ. Balachandran K.K. Post Harvest Technology of Fish and Fishery Products
15. Brody J. Fishery Byproduct Technology
16. Chaston I. 1983. Marketing in Fisheries and Aquaculture. Fishing News Books.
17. Coles, R., McDowell, D. and Kirwan, M.J. (Eds.) Food Packaging Technology, CRC Press, 2003.
18. Dayanandan, R. - Entrepreneurship Development and Small Business Enterprises.
19. Dennis A, Brandfield R, Al Halborg & Ross C. 2004. Marketing Principles and Practice.
20. Pitman Publ. Ian C. 1984. Marketing in Fisheries and Aquaculture. Fishing News Books.

21. Food Packaging Technology Handbook. NIIR Board, National Institute of Industrial Research, 2003.
22. Gopakumar K. (Ed.). 2002. Text Book of Fish Processing Technology. ICAR.
23. Govindan, T.K. Fish Processing Technology, Oxford-IBH, 1985.
24. Hall GM. (Ed.). 1992. Fish Processing Technology. Blackie.
25. Han, J.H. (Ed.) Innovations in Food Packaging, Elsevier Academic Press, 2005.
26. Wheaton FW & Lawson TB. 1985. Processing Aquatic Food Products. John Wiley & Sons.
27. Windsor M & Barlow. 1981. Introduction to Fishery Byproducts. Fishing News

Evaluation Scheme for First Year Bsc -Zoology (UG)

under NEP 2020 (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment (CIA) Assignment - Tutorial/ Case Study/ Project / Presentations/ Group Discussion / Ind. Visit. – 10 marks

2) Continuous Internal Assessment (CIA) ONLINE / OFFLINE Unit Test – 10 marks - 15 Minutes

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hour Theory question paper pattern:

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

All questions shall be compulsory with internal choice within the questions. Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

NOTE: To pass the examination, attendance is compulsory in both Internal & External Theory Examinations.

**FY BSc Zoology Evaluation pattern and
Question paper pattern for Semester End Practical
Examination of Major Course**

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Viva/ assignment/ objective question test /Small experiments (15 Marks), Overall performance (5 Marks) = 20 Marks	As per paper pattern	1 hr 30 mins

**FY BSc Zoology Evaluation pattern and Question paper pattern for
Semester End Practical Examination of Vocational Skill Courses and
Skill Enhancement Courses**

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Viva/ assignment/ objective question test /Small experiments (15 Marks), Overall performance (5 Marks) = 20 Marks	As per paper pattern	1 hr 30 mins

Signatures of Team Members

SR.No.	Name	Signature
1.	Dr S. B. Donde	
2.	Dr Vanita Kamat	
3.	Dr Rishikesh Dalvi	
4.	Dr Parag Masram	
5.	Dr Samir Terdalkar	
6	Prof Sagar Gavas	
7	Mr Suhas Parab	

Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 – 100	O (Outstanding)	10
8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 - < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 - < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 - < 60.0	B (Above Average)	6
5.00 - < 5.50	50.0 - < 55.0	C (Average)	5

4.00 - < 5.00	40.0 - < 50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Justification for Bachelors in Zoology

1.	Necessity for starting the course:	The B.Sc. (Zoology) course is necessary because it serves as a fundamental, multidisciplinary, and practical programme that prepares students for pursuing higher education, allows them to explore numerous career options, and actively participate in tackling scientific and societal challenges.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2023-24.	The course has already commenced in the university and in the academic year 2023-24 it is restructured under NEP 2020
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?:	This course is aided based on the sanction given by University of Mumbai to affiliated colleges time to time.
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	The duration of the program is three years (6 semesters). It is not possible to compress the course.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	120 per division
7.	Opportunities of Employability / Employment available after undertaking these courses:	Graduation in Zoology provides students with a greater awareness of the intricate relationships within the animal kingdom and the environment, as well as the ability to think critically and practically, allowing them to enhance their career prospects and open up novel opportunities.