

UNIVERSITY  **OF MYSORE**
Estd. 1916

Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/151/2020-21

Dated: 01.09.2023

Notification

Sub:- Syllabus and Scheme of Examinations of Zoology (UG)
(V & VI Semester) with effect from the Academic year 2023-24.

Ref:- 1. This office letter No: AC6/303/2022-23 dated: 28-07-2023.
2. Decision of BOS in Zoology (UG) meeting held on 05-08-2023.

The Board of Studies in Zoology (UG) which met on 05-08-2023 has resolved to recommended and approved the syllabus and scheme of Examinations of Zoology programme (V & VI Semester) with effect from the Academic year 2023-24.

Pending approval of the Faculty of Science & Technology and Academic Council meetings the above said syllabus and scheme of examinations are hereby notified.

The syllabus and scheme of Examinations contents may be downloaded from the University website i.e., www.uni-mysore.ac.in.


Registrar
University of Mysore
Mysore

To:-

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS, in Zoology, Manasagangothri, Mysore.
4. The Director, Distance Education Programme, Moulya Bhavan, Manasagangothri, Mysuru.
5. The Director, PMEB, Manasagangothri, Mysore.
6. Director, College Development Council , Manasagangothri, Mysore.
7. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
8. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
9. Office Copy.



GOVERNMENT OF KARNATAKA

**Curriculum Framework for Four-Year
Undergraduate Multidisciplinary Programme (Honours
) & Master Program in Colleges and Universities of Karnataka
State.**



5th Semester
Model Syllabus for
BSc. in Zoology

Submitted to
VICE CHAIRMAN
Karnataka State Higher Education Council
30, Prasanna Kumar Block,
Bengaluru City University Campus,
Bengaluru, Karnataka-560009

COMPOSITION OF SUBJECT EXPERT COMMITTEE MEMBERS

S N	Name and Organization	Designation
1	Prof.K.Vijaykumar,DepartmentofZoology,GulbargaUniversity,Kalaburagi.9480060508,katepaga63@gmail.com	Chairman
2	Prof.PMBasha,DepartmentofZoology,BangaloreUniversity,Bengaluru.9448701652,pmbashabub@rediffmail.com	Member
3	Prof.VijaykumarBMalashetty,DepartmentofZoology,VSKUniversity,Ballari.9343011567,vijaymalashetty@gmail.com	Member
4	Prof. S. Basavarajappa,MysoreUniversity,Mysuru.9449203241 E-mail: ornithorajl1@gmail.com	Member
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12	Dr.AsiyaNuzhathF.B,AssociateProfessor,Dept.ofZoology,TumkurUniversity,Tumakuru.9844029441	Member
13	Dr. Akshatha, Special Officer, KSHEC, Bengaluru. 9535487108	Member Convener



GOVERNMENT OF KARNATAKA

MODEL CURRICULUM

*Model Curriculum of
B.Sc. Honours
in*

ZOOLOGY

5th Semester

**KARNATAKA STATE HIGHER
EDUCATION COUNCIL**

BENGALURU

Government of Karnataka



Model Curriculum

Program Name	B.Sc.	V Semester	
Course Title	Non-Chordates and Economic Zoology (Theory)		
Course Code:	ZOOC	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	3hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Out comes (POs)

Course Out comes(COs)/(POs)	ZOO C9T	ZOO C10P	ZOO C11T	ZOO C12P	ZOO C13T	ZOO C14P	ZOO C15T	ZOO C16P	ZOO C17T	ZOO C18P
I Core competency	X									
II Critical thinking	X									
III Analytical reasoning	X									
IV Research skills	X									
V Team work	X									

Course Articulation Matrix relates course outcomes of course with the corresponding program out comes whose attainment is attempted in this course. Mark 'X' in the inter section cell if a course outcome addresses a particular program out come.

Course Pre-requisite(s):	
<p>Course Out comes (COs): After the successful completion of the course, the student will be able to: CO1. Group animals on the basis of their morphological characteristics/structures. CO2. Demonstrate comprehensive identification abilities of Non-Chordate diversity CO3. Explain structural and functional diversity of Non-Chordates CO4. Develop understanding on the diversity of life with regard to protists, non chordates and chordates. CO 5. Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/cladistics tree.</p>	
Contents	60Hrs
Unit-I	15

General characters, classification up to classes with suitable examples to all phyla	
1. Protozoa to Coelenterate	
<ul style="list-style-type: none"> • Protozoa-<i>Paramecium</i>(Morphology and Reproduction) • Porifera-<i>Sycon</i> (Canal System) • Coelenterata – <i>Obelia</i> (Morphology and Reproduction) 	
1. Ctenophora to Nematheiminthes	
<ul style="list-style-type: none"> • Ctenophora –Salient feature • Platyhelminthes - <i>Taenia</i> (Tapeworm)(Morphology and Reproduction) • Nematelminthes - <i>Ascaris lumbricoides</i> (Morphology and Reproduction) 	
Unit-II	15
3. Annelida	
<ul style="list-style-type: none"> • Annelida-<i>Hirudinaria</i>(Leech) (Morphology and Reproduction) 	
4. Arthropoda	
<ul style="list-style-type: none"> • Arthropoda-<i>Palaemon</i> (Prawn) Morphology, Appendages, Nervous System and Reproduction) 	
Unit-III	15
6. Mollusca to Hemichordata	
<ul style="list-style-type: none"> • Mollusca-<i>Pila</i> (Morphology, Shell, Respiration, Nervous System and Reproduction • Echinodermata-<i>Pentoceros</i> (Morphology and Water Vascular System) 	
Unit-IV	15
7. Economic Zoology: Vectors and Pests	
<ul style="list-style-type: none"> • Life cycle and their control of following pests: Gundhi Bug, Sugarcane leafhopper, Rodents, Termites and Mosquitoes and their control 	
8. Economic Zoology: Lac-culture, Vermiculture and Poultry	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs1-15)

Course Outcomes (COs)/Program Outcomes (POs)	Program Outcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					X										
					X										
					X										
					X										
					X										

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/type	Marks
House Examination/Test	15
Written Assessment/Presentation/Project/Term Papers/Seminars	15
Classroom Performance/Participation	10
Total	40 Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

Model Curriculum

Course Title	Non-Chordates and Economic Zoology (Practical)	Practical Credits	2
Course Code	ZOO C10-P	Contact Hours	
Formative Assessment	25Marks	Summative Assessment	25Marks

Course Pre-requisite(s):

Course Outcomes(COs):

At the end of the course the student should be able to:

1. Understand basics of classification of non-chordates.
2. Learn the diversity of habit and habitat of these species.
3. Develop the skills to identify different classes and species of animals.
4. Know uniqueness of a particular animal and its importance

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs)/(POs)	ZOO C9T	ZOO C10P	ZOO C11T	ZOO C12 P	ZOO C13T	ZOO C14P	ZOO C15T	ZOO C16P	ZOO C17T	ZOO C18P
I Core competency		X								
II Critical thinking		X								
III Analytical reasoning		X								
IV Research skills		X								
V Team work		X								

Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Practical Content

1. Preparation and observation of protozoan culture.
2. **Protozoa:** Systematics of *Amoeba*, *Euglena*, *Noctiluca*, *Paramecium* and *Vorticella* (Permanent slides).

<ol style="list-style-type: none"> 3. Porifera:Systematics of <i>Sycon</i>, <i>Euplectella</i>, <i>Hyalonema</i>, <i>Spongilla</i> and <i>Euspongia</i> (Specimens). Study of permanent slides of T.S of <i>Sycon</i>, spicules and gemmules. 4. Cnidaria:Systematics of <i>Aurelia</i> and <i>Metridium</i> (Specimens). Slides of <i>Hydra</i>, <i>Obelia</i>-polyp and medusa, and <i>Ephyra</i> larva, T.S. of <i>Metridium</i> passing through mesenteries. 5. Stud y of Corals - <i>Astraea</i>, <i>Fungia</i>, <i>Meandrina</i>, <i>Corallium</i>, <i>Gorgonia</i>, <i>Millepora</i> and <i>Pennatula</i>. 6. Helminthes:Systematics of <i>Planaria</i>, <i>Fasciola hepatica</i> and <i>Taenia solium</i>, Ascaris-Male and female (Specimens). Slides of T.S. of <i>Planaria</i>, T.S of male and female Ascaris. 7. Annelida:Systematics of <i>Nereis</i>, <i>Sabella</i>, <i>Aphrodite</i> and Leech (Specimens) Slide of T.S. of Earthworm through typhlosole. 8. Arthropoda:Systematics of <i>Panaeus</i>, <i>Palaemon</i>, <i>Astracus</i>, Scorpion, Spider, <i>Limulus</i>, <i>Peripatus</i>, <i>Millipede</i>, <i>Centipede</i>, Prayingmantis, Termite Queen, Moth, Butterfly, Dung beetle / Rhinoceros beetle (Any six specimens). Slide of Larvae-Nauplius, Zoa and Mysis. 9. Mollusca:Systematics of <i>Chiton</i>, <i>Mytilus</i>, <i>Aplysia</i>, <i>Pila</i>, <i>Octopus</i>, <i>Sepia</i> (Specimens) and Glochidium larva (Slide). 10. ShellPattern-<i>Unio</i>, <i>Ostrea</i>, <i>Cypria</i>, <i>Murex</i>, <i>Nautilus</i>, <i>Patella</i>, <i>Dentalium</i>, Cuttlebone. (Any four) 11. Echinodermata:Systematics of Seastar, Brittlestar, Sea Urchin, Sea cucumber, Sealilly (Specimens). Slides of Bipinnaria larva, Echinopluteus larva and Pedicellaria. 12. Harmful Non chordates: Soil Nematodes. Agricultural, veterinary and human pests of Arachnida and Arthropoda. 13. Beneficial Non-chordates: <ul style="list-style-type: none"> • Sericulture: Lifecycle of <i>Bombyx mori</i>, Uzifly, Cocoon, Raw silk. • Apiculture: Any 2 Species of honeybee and bee wax. • Pearl Culture: Pearl Oyster and Natural Pearls. 14. Virtual Dissection/Cultured specimens: Earthworm – Nervous system, Leech-Digestive System 15. Virtual Dissection/Cultured specimens: Prawn-Nervous system. Cockroach-Salivary Apparatus and Digestive system. 	
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Pedagogy: Lectures, Presentations, Videos, Assignments and Weekly Formative Assessment Tests

Note: Field visit to nearby National park/ Wildlife sanctuary/ any National laboratory at the end of semester is compulsory and the report of this is to be submitted along with practical record as a part of practical examination.

Formative Assessment for Practical	
Assessment Occasion/type	Marks
House Examination/Test	10
Written Assessment/Presentation/Project/Term	10

Papers/Seminars	
Class room Performance/Participation	5
Total	25 Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

References	
1	Barnes, R.S.K.; Calow,P.; Olive,P.J.W.; Golding,D.W.; Spicer, J.I.(2002) The Invertebrates: Synthesis,BlackwellPublishing.
2	Hickman,C.; Roberts,L.S.; Keen,S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
3	Holland, P.(2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
4	Kardong, K.V.(2006) Vertebrates: Comparative Anatomy, Function, Evolution (4thedition), McGraw-Hill.
5	Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
6	Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7	Bushbaum, R. (1964)Animals without Back bones. University of Chicago Press.

Government of Karnataka



Model Curriculum

Program Name	B.Sc.	Semester	V
Course Title	Chordates and Comparative Anatomy (Theory)		
Course Code:	ZOOC11-T	No. of Credits	4
Contact hours	60Hours	Duration of SEA/Exam	2hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. To demonstrate comprehensive identification abilities of chordate diversity

CO2. Able to explain structural and functional diversity of chordate diversity

CO3. To understand evolutionary relationship amongst chordates

CO4. To take up research in biological sciences.

CO5. To realize that very similar physiological mechanisms are used in very diverse organisms.

CO6. To Get a flavor of research by working on project besides improving their writing skills. It will further enable the students to think and interpret individually.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs)/(POs)	ZOO C9T	ZOO C10P	ZOO C11T	ZOO C12 P	ZOO C13T	ZOO C14P	ZOO C15T	ZOO C16P	ZOO C17T	ZOO C18P
I Core competency			X							
II Critical thinking			X							
III Analytical reasoning			X							

IV Research skills			X							
V Team work			X							

Course Articulation Matrix relates course outcomes of course with the corresponding program out comes whose attainment is attempted in this course. Mark 'X' in the intersection cell if a course outcome addresses a particular program outcome.

Contents	60Hrs
Unit-I	15 hrs
<p>Chapter1: Chordates: General characters of each class of chordate with suitable examples. Origin of Chordates. Basic characters of chordates and classification up to classes.</p> <p>Chapter2: Hemichordata: Type Study of <i>Balanoglossus</i>–Habit and Habitat, Morphology, Coelom. Tornaria larva and its affinities. Affinities and systematic position of Hemichordata.</p> <p>Chapter3:Urochordata: Type Study of <i>Herdmania</i>-Habit and Habitat, Morphology, Ascidian Tadpole-structure and its retrogressive metamorphosis.</p> <p>Chapter4:Cephalochordata : Type Study of <i>Branchiostoma (Amphioxus)</i>-Habit and Habitat, Morphology, Digestive system, Feeding mechanism, excretory and circulatory system.</p> <p>Chapter5: Agnatha General characters of Agnatha and classification up to classes. Salient features of Cyclostomata and Ostracodermi with orders And examples. Ammocoete larva and its significance.</p>	
Unit-II	15
<p>Chapter6:Vertebrates: General characters and Classification of different classes of vertebrates (Pisces, Amphibia, Reptilia, Aves, Mammalia) up to the order with five characters for each order citing examples. General characters of Chondrichthyes and Osteichthyes. Interesting features and evolutionary significance of Dipnoi. Salient features of Placodermi with examples. Interesting features of <i>Sphenodon</i>, crocodile and <i>Archaeopteryx</i>. Salient features of Ratitae and Carinatae with examples. Interesting features of mammalian orders (Insectivora, Carnivora, Chiroptera, Cetacea, Proboscidea, Ungulata–Perissodactyla and Artiodactyla, and Primates–Platyrrhini and Catarrhini) with examples.</p>	

Unit-III	15
<p>Chapter7.GeneralaccountofChordates: Types of caudal fins, scales and swim bladder in fishes. Origin of Amphibia. Neoteny and Paedogenesis. Adaptive radiation in extinct reptiles with suitable examples. Temporal fossae in reptiles. Poison apparatus and biting mechanism in snakes. Parental care in Pisces and Amphibians. Flight adaptations in birds. Dentition in mammals. Evolution of molar tooth. Migration in Pisces, Birds and Mammals.</p>	
Unit-IV	15
<p>Comparative Anatomy of Vertebrates:</p> <p>Chapter8. Integumentary System: Structure of skin and its derivatives.</p> <p>Chapter 9. Skeletal System</p> <ul style="list-style-type: none"> • Comparative account of Axial Skeletal system in vertebrates; Skull- Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and Mammals (Man). • Comparative account of Appendicular skeletal system in vertebrates- Pectoral and Pelvic girdles of Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and Mammals (Man). <p>Chapter-7 Respiratory system</p> <ul style="list-style-type: none"> • Comparative account of respiratory system in vertebrates: Pisces (Scoliodon), Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and Mammals (Man). <p>Chapter-8 CirculatorySystem</p> <ul style="list-style-type: none"> • Comparative account of heart and aortic arches in vertebrates: Pisces (Scoliodon), Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and Mammals (Man). <p>Chapter-9 Excretory System</p> <ul style="list-style-type: none"> • Succession of kidney in vertebrates. <p>Chapter-9 Nervous system</p> <ul style="list-style-type: none"> • Comparative account of brain in vertebrates: Pisces (Scoliodon), Amphibian (Frog), Reptiles (Lizard), Aves (Pigeon) and Mammals (Man). 	



Model Curriculum

Course Title	Chordates and Comparative Anatomy Zoology (Practical)	Practical Credits	2
Course Code	ZOO C12-P	Contact Hours	
Formative Assessment	25Marks	Summative Assessment	25Marks

Course Pre-requisite(s):

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / (POs)	ZOO C9T	ZOO C10P	ZOO C11T	ZOO C12 P	ZOO C13T	ZOO C14P	ZOO C15T	ZOO C16P	ZOO C17T	ZOO C18P
I Core competency				X						
II Critical thinking				X						
III Analytical reasoning				X						
IV Research skills				X						
V Team work				X						

Course Articulation Matrix relates course out comes of course with the corresponding program out comes whose attainment is attempted in this course. Mark 'X' in the inter section cell if a course outcome addresses a particular program out come.

Practical Content	
<p>1. Protochordata: Balanoglossus and its T. S. through proboscis Ascidian/<i>Herdmania</i> and <i>Amphioxus</i>, T.S. of <i>Amphioxus</i> through pharynx and intestine.</p> <p>2. Cyclostomata: -<i>Petromyzon</i>, Ammocoete larva and <i>Myxine</i>.</p> <p>3. Pisces:</p> <p>4. Cartilaginous Fishes – <i>Narcine</i>, <i>Trygon</i>, <i>Pristis</i>, <i>Mylobaties</i></p> <p>5. Bony Fishes–Zebrafish, Hippocampus, Muraena, Ostracion, Tetradon, Pleuronectus,</p> <p>6. Diodon, Echeneis. (Any four).</p> <p>7. Ornamental fishes: -Siamese, Koi, Oscar, Betta Sp., Neon tetra, Guppies, Goldfish, Angle fish, Rainbow fish, Mollies (Locally available any five aquarium fishes).</p> <p>8. Accessory respiratory organs– <i>Sacco branchus</i>, <i>Clarias</i> and <i>Anabas</i>.</p> <p>9. Amphibia: - <i>Rana</i>, <i>Bufo</i>, <i>Ambystoma</i>, <i>Axolotllarva</i>, <i>Necturus</i> and <i>Ichthyophis</i>.</p> <p>10. Reptilia: -Turtle, Tortoise, <i>Mabuya</i>, <i>Calotes</i>, Chameleon, <i>Varanus</i>. snakes–<i>Dryophis</i>, Rat snake, Brahmini, Cobra, Krait, Russell’s viper and <i>Hydrophis</i>;</p> <p>11. Aves: Beak and feet modifications in the following examples:Duck, Crow, Sparrow, Parrot, Kingfisher, Eagle or Hawk. (Any four)</p> <p>12. Mammalia: Mongoose, Squirrel, Pangolin, Hedge Hog, Rat and Loris. (Any four)</p> <p>13. Virtual Dissection/Cultured specimens: Shark/Bony fish: Afferent and efferent branchial systems, glosso-pharyngeal and vagus nerves.</p> <p>14. Virtual Dissection/Cultured specimens: Rat: Dissection (only demonstration)– Circulatory system (arterial and venous), Urinogenital system.</p> <p>14- 16. Skeletal System in Shark/ Frog/ Pigeon/ Rabbit: Skull, vertebrae, girdles and limb bones (Except hands and feet)</p>	<p>15 units</p>

Pedagogy:

Note: Field visit to nearby National park/ Wildlife sanctuary/ any National laboratory at the end of semester is compulsory and the report of this is to be submitted along with practical record as a part of practical examination.

Formative Assessment for Practical	
Assessment Occasion/type	Marks
House Examination/Test	10
Written Assessment/Presentation/Project/Term Papers/Seminars	10
Classroom Performance/Participation	5
Total	25Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

References	
1	Colbert <i>et al</i> : Colbert's Evolution of the Vertebrates: A history of the back boned animals through time. (5 th ed 2002, Wiley-Liss).
2	Hildebrand: Analysis of vertebrate Structure (4 th ed 1995, John Wiley)
3	Kenneth V. Kardong (20015) vertebrates: Comparative Anatomy, Function, Evolution McGraw Hill
4	McFarland <i>et al.</i> ,: Vertebrate Life (1979, Macmillan publishing)
5	Parker and Haswell: Text Book of Zoology, Vol. II(1978, ELBS)
6	Romer and Parsons: The Vertebrate Body (6 th ed 1986, CBS Publishing Japan)
7	Young: The Life of vertebrates (3 rd ed 2006, ELBS/Oxford)
8	Weichert C. K. and William Presch (1970). Elements of Chordate Anatomy, Tata McGraw Hills



Government of Karnataka

Curriculum Framework for Four-Year Undergraduate Multidisciplinary Programme(Honours)&Master Programme in Colleges and Universities of Karnataka State.



**Model Syllabus for
6th Semester**

Submitted to Vice-Chairman

Karnataka State Higher Educational Council

30, Prasanna Kumar, Bangalore City University Campus,

Bangalore, Karnataka- 560009



Government of Karnataka

Model Curriculum

Program Name	B.Sc.	Semester	VI
Course Title	Evolutionary & Developmental Biology (Theory)		
Course Code:	ZOOC15-T	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/ Exam	3hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to: <ul style="list-style-type: none"> • Understand that by biological evolution we mean that many of the organisms that inhabit the earth today are different from those that inhabited it in the past. • Understand that natural selection is one of several processes that can bring about evolution, although it can also promote stability rather than change. • Understand how the single cell formed at fertilization forms an embryo and then a full adult organism. • Integrate genetics, molecular biology, biochemistry, cell biology, anatomy and physiology during embryonic development. • Understand a variety of interacting processes, which generate an organism's heterogeneous shapes, size, and structural features. • Understand how a cell behaves in response to an autonomous determinant or an external signal, and the scientific reasoning exhibited in experimental life science. 	
Contents	60Hrs
Unit-I	16
1. Theories of Evolution: Origin of Life, Historical review of evolutionary concept: Lamarckism, Darwinism (Natural, Sexual and Artificial selection), Modern synthetic theory of evolution, Adaptive radiations: Patterns of evolution (Divergence, Convergence, Parallel, Co-evolution)	8
2. Population Genetics: Microevolution and Macroevolution: allele frequencies, genotype frequencies, Hardy- Weinberg equilibrium and conditions for its maintenance, Forces of evolution: mutation, selection, genetic drift	8
Unit-II	14
3. Direct Evidences of Evolution: Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse.	7

4. Species Concept and Extinction: Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric), Mass extinction (Causes, Names of five major extinctions).	7
Unit-III	14
5. Gamete Fertilization and Early Development: Gametogenesis, Fertilization, Cleavage pattern, Gastrulation, fate maps and Morphogenesis.	6
6. Developmental Genes: General concepts of organogenesis, Introduction to genetic basis of embryonic development and Developmental control genes (Homeobox genes)	8
Unit-IV	16
7. Early Vertebrate Development: Early development of mammals including placentation, Metamorphosis, regeneration, Environmental regulation of development	8
8. Late Developmental Processes, Development of eye, kidney, limb in amphibian, Mammalian female reproductive cycles estrous cycle and menstruation, Aging: the biology of senescence	8

Course Articulation Matrix: Mapping of Course Out comes (COs) with Program Out comes (POs1-15)

Course Out comes(COs)/ Program Out comes(POs)	Program Outcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Pedagogy:.....

Formative Assessment for Theory	
Assessment Occasion /type	Marks
House Examination/ Test	15
Written Assessment /Presentation/Project/Term Papers/Seminars	15
Classroom Performance/Participation	10
Total	40Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

Course Title	Evolutionary & Developmental Biology (Practical)	Practical Credits	2
Course Code	ZOO C16-P	Contact Hours	4 Hours
Formative Assessment	25 Marks	Summative Assessment	25Marks
PracticalContent			
1. Study of fossils from models/ pictures.			
2. Study of homology and analogy from suitable specimens			
3. .Study and verification of Hardy-Weinberg Law by chi square analysis.(Any three problems)			
4. Graphical representation and interpretation of data of height / weight of a sample. Of 100 humans in relation to their age and sex.			
5. Types of eggs based on quantity and distribution of yolk: Seurchin, insect, frog , Chick.			
6. Study of development of chick embryo through incubated chick eggs upto 96h.			
7. Study of adaptive radiations in feet of birds and mouth parts of insects.			
8. Frog embryology: Egg, Sperm, Early cleavage stages, Blastula, Gastrula and Neurula			
9. Chick Embryology: Egg, Sperm, Primitive streak, 24H, 36H and 48 Hours embryo whole mount.			

Pedagogy: Lectures, Presentations, Videos, Assignments and Weekly Formative Assessment Tests

Formative Assessment for Practical	
Assessment Occasion/type	Marks
House Examination/Test	05
Written Assessment/Presentation/Project/Term Papers/Seminars	10
Class room Performance / Participation	10
Total	25Marks
<i>FormativeAssessmentasperNEPguidelinesarecompulsory</i>	

References	
1	Ridley, M (2004) Evolution (3 rd edition) Black well Publishing
2	Hall, B.K. and Hallgrimson, B (2008) Evolution (4 th edition) Jones and Barlett Publishers
3	Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. Cold Spring, Harbour Laboratory Press.
4	Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
5	Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
6	Developmental Biology: T. Subramaniam, (Reprint), Narosa Publishing House Pvt. Ltd., New Delhi
7	Developmental biology: Werner A. Müller, Springer Science & Business Media. (2012).
8	Human Embryology and Developmental Biology E-Book: Bruce M. Carlson, Elsevier Health Sciences.
9	Developmental Biology: Michael J. F. Barresi, Scott F. Gilbert, Oxford University Press. (2019).



Government of Karnataka

Model Curriculum

Program Name	B.Sc.	Semester	VI
Course Title	Environmental Biology, Wildlife Management & Conservations (Theory)		
Course Code:	ZOO C17-T	No. of Credits	4
Contact hours	60Hours	Duration of SEA/Exam	Hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to:	
CO1. Develop an understanding of how animals interact with each other and their natural environment.	
CO2. Develop the ability to use the fundamental principles of wildlife ecology to solve local, regional and national conservation and management issues.	
CO3. Develop the ability to work collaborative team-based projects.	
CO4. Gain an appreciation for the modern scope of scientific inquiry in the field of wildlife conservation management.	
CO5. Develop an ability to analyze, present and interpret wildlife conservation Management information.	
Contents	60Hrs
Unit-I	15
1. Ecology: Introduction to ecology, Definition, ecosystem, types of ecosystem, food chain and food web, trophic levels. Environment: Definition, types of environment, terrestrial, aquatic, desert, grassland and aerial environment. Environmental Biology: Adaptive features of plants and animals to different environment. Ecological factors, weather, climate, ozone layer.	
Unit-II	15
2. Pollution: Definition, types of pollutants, air, soil, water and thermal pollution, ozone layer depletion, biomagnifications, bioaccumulation and bioremediation. Effects of pollution on plants and animals.	
Unit-III	15
3. Wildlife Conservation: National parks, Wildlife sanctuaries, biosphere reserve. Project tiger. Project Elephant. Habitat preservation, breeding in captivity. Ex-situ and in-situ conservation. Wildlife Protection Act 1972.	
Unit-IV	15
4. Wildlife Management : Values of wildlife, Causes and depletion of wildlife, inventory and classification of wetlands and their biotic components, general strategies and issues, concept of home range, wildlife corridors and territory, animal census, tracing movement and remote sensing and GIS.	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs1-15)

Course Outcomes(COs)/ Program Outcomes(POs)	Program Outcomes(POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Pedagogy:.....

Formative Assessment for Theory	
Assessment Occasion/type	Marks
House Examination/Test	15
Written Assessment/Presentation/Project/Term Papers/Seminars	15
Classroom Performance/ Participation	10
Total	40Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

Course Title	Environmental Biology, Wildlife Management & Conservation (Practicals)	Practical Credits	2
Course Code	ZOO C-18-P	Contact Hours	4 Hours
Formative Assessment	25Marks	Summative Assessment	25Marks
Practical Content			
1. Water quality parameters assessment: Collection of water sample, Dissolved Oxygen (O ₂), Carbon dioxide (CO ₂), Biological Oxygen Demand (BOD) Chemical Oxygen Demand (COD), chlorides, Hardness and salinity estimation in water. (Any four)			
2. Analysis of physico-chemical parameters of soil: pH, soil moisture, soil temperature, organic matter in soil.			
3. Analysis of air pollution: Air monitoring for particulate matter			
4. Visit of pond and lakes: Collection and identification of flora and fauna of selected ecosystems. Collection, preservation of phytoplanktons, zooplanktons and insect larva..			
5. Demonstration of field equipments used in wildlife census: Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of cameras and lenses.			
6. Identification wild animals: Wild animal's pugmarks, hoof marks scats, pellet groups, nest, antlers. Demonstration of field techniques for wild flora and fauna.			

Pedagogy: Lectures, Presentations, Videos, Assignments and Weekly Formative Assessment Tests

Note: Field visit to near by National park/ Wildlife sanctuary/ any National laboratory at the end of semester is compulsory and the report of this is to be submitted along with practical record as a part of practical examination.

FormativeAssessmentforPractical	
Assessment Occasion/type	Marks
House Examination/Test	05
Written Assessment /Presentation/Project/Term Papers/Seminars	10
Classroom Performance /Participation	10
Total	25Marks
<i>Formative Assessment as per NEP guidelines are compulsory</i>	

References	
1	Colinvaux, P. A.(1993) Ecology (2 nd edition)Wiley, John and Sons, Inc.
2	Krebs,C. J.(2001)Ecology(6 th edition) Benjamin Cummings.
3	Odum,E.P., (2008) Fundamentals of Ecology. IndianEdition. Brooks/Cole. (3 rd Edition) BlackwellSci.
4	Kendeigh, FC.(1984) Ecology with Special Reference to Animal and Man. Prentice HallInc.
5	Caughley,G. and Sinclair, A.R.E.(1994)Wildlife Ecology and Management. Blackwell Science.
6	Woodroffe,R., Thirgood, S. and Rabinowitz,A. (2005) People and Wildlife, Conflict Or Co-existence? Cambridge University.
7	Bookhout,T.A. (1996) Research and Management Techniques for Wildlife and Habitats (5 th edition) The Wildlife Society,Allen Press.
8	Sutherland, W.J. (2000)The Conservation Handbook: Research, Management and Policy. Blackwell Sciences
9	Hunter M.L., Gibbs,J.B. and Sterling,E.J.(2008) Problem solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing