



DETAILED CURRICULUM
B.Sc. (ZOOLOGY)
SEMESTER-I

SEMESTER PATTERN :

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practicals is allotted on Semester pattern.
- There shall be **01 Theory papers 70 marks each** of 2.5 Hours duration. [70+30 marks Internal =100marks]
- Zoology Practical Examination shall be of 50 **marks** of 3.0 **hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-1 & 2)

Paper No.	Subject Code	Name Of The Paper	Total Marks Ext.+Int* = Total	Passing Standard Ext.+Int = Total	Total Teaching Hours	Exam Hours	Credits
ZOCC-103	22859	Diversity of Life, Histology, General Morphology and functional anatomy, Genetics and Animal Biotechnology, Ecology and Pollution	70+30 =100	28+12=40	15 WEEKS X 4 HOURS = 60	2.5	04
ZOCC-104	22860	Zoology practical	50	28	15 WEEKS X 4 HOURS = 60	03	02

INTERNAL MARKS : 30



B.Sc. (ZOOLOGY)
SEMESTER-I

Paper No: ZOCC-103

Title of the Paper: Diversity of Life, Histology, General Morphology and functional anatomy, Genetics and Animal Biotechnology, Ecology and Pollution

Credits: 04

Code: 22859

Marks: Semester End Examination: 70 Marks
Internal: 30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	<p>A. Diversity of Life</p> <p>Classification of the following animals up to the classes:</p> <ul style="list-style-type: none">• Classification of phylum Protozoa with examples.• Classification of phylum Porifera with examples.• Classification of phylum Coelenterata with examples.• Classification of phylum Platyhelminthes with examples.• Classification of phylum Nematelminthes with examples.• Classification of group Protochordata up to sub phylum with Examples.• Classification of class Cyclostomata up to order with examples.• Classification of super class Pisces with examples. <p>B. Mammalian Histological structure of the following organs:</p> <ul style="list-style-type: none">• Stomach.• Intestine.• Liver.• Pancreas.• Kidney.• Smooth Muscles.• Skeletal Muscles.• Cardiac Muscles.	15	18



2	<p>General Morphology and functional anatomy: Hydra:</p> <ul style="list-style-type: none">• Habits and habitat• Different methods of locomotion.• Different methods of Reproduction.• Body wall.• Cnedoblast. <p>Liver fluke anatomy:</p> <ul style="list-style-type: none">• Habits and habitat• External character.• Body wall.• Digestive system.• Nervous system.• Excretory system.• Reproductive system. <p>Liver fluke Life cycle:</p> <ul style="list-style-type: none">• Fertilized egg.• Miracidium larva• Sporocyst.• Radia larva.• Cercaria.• Metacercaria.• Adult Liver fluke• Parasitic adaptation of liver fluke.	15	18
3	<p>A. Genetics</p> <ul style="list-style-type: none">• Introduction to Gene• Introduction to Mendelian laws of Heredity.• Monohybrid and Dihybrid cross.• Incomplete dominance (e.g. Mirabilis Jalapa).• Co dominance (e.g. Roan cattle).• Multiple alleles e.g. ABO blood group in humans• Rh factor- Erythroblastosis fetalis• Polygenic inheritance (e.g. skin colour in humans)• Lethal Genes (e.g. yellow coat colour in mice, thalassaemia). <p>B. Animal Biotechnology: Brief introduction & Definition:</p> <ul style="list-style-type: none">• Fields of animal biotechnology• Some lab. Facilities needed for setting up a tissue culture laboratory.• Glass wares• Autoclave• pH meter- Introduction to genetics engineering in zoology.	15	17



4	<p>Ecosystem:</p> <ul style="list-style-type: none">• Types of ecosystems with marine aquatic ecosystem in detail,• Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains.• Food web, Energy flow through the ecosystem.• Ecological pyramids and Ecological efficiencies.• Nutrient and biogeochemical cycle with one example of Nitrogen cycle. <p>B Pollution:</p> <p>A brief account of :</p> <ul style="list-style-type: none">• Air pollution• Water pollution (Minamata diseases)• Soil pollution• Noise pollution• Plastic pollution	15	17
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**B.Sc. (Zoology)
SEMESTER-I**

Paper-ZOCC-104

Code: 22860

Title of the Paper: Zoology Practical

Credits: 02

Marks: Semester End Examination: 50 Marks

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOOCC-103]

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (Secu.) dated: 31/10/06

All the topics of the practicals are being taught by Models, Charts, Figures, Slides and computer animations.

Students have to prepare their Practical journals of Zoology for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

There shall be Local Excursion/ Camp for the awareness to the Biodiversity and conservation.

Detailed Syllabus for Zoology practical

Practical-1A To Study various components of compound microscope.

Practical-1B To Study Bacteria and typical animal cell.

Classification of the following animals up to class:

Practical –2A Classification of Phylum Protozoa.

Protozoa : Amoeba, Paramecium, Euglena, Arcella, Ceratium Plasmodium, Opalina

Practical – 2B Classification of Phylum Porifera to Coelenterata.

Porifera : Grantia, Hylonema, leucosolenia.

Coelenterata: Hydra, Sea-anemone, Jellyfish, Physalia, Rhizostoma, Gorgonia, Coral.

Practical-3A Classification of Phylum Platyhelminthes and Nematelminthes.

Platyhelminthes : Liver fluke, Planaria, Tapeworm. Nematelminthes:

Guinea worm, Ascaris (Male & Female) and Filaria.

Practical-3B Classification of Protochordata up to sub phylum and Classification of Cyclostomata up to order.

Protochordata: Ascidia, Amphioxus, Balanoglossus. Cyclostomata:

Lamprey.

Practical-4A Classification of super class Pisces (up to class): Scoliodon,

Electric ray, Eel, Ophiocephalus, Sea horse.

Practical-4B To Study life history of Hydra.

Practical-5A To Study life history of Liver fluke.

Practical-5B Histological studies of the followings, mammalian tissues with the help of permanent slides:

1. Stomach. 2. Intestine. 3. Liver. 4. Kidney



Practical-6A Histological studies of the followings, mammalian tissues with the help of permanent slides: 1. Pancreas. 2. Smooth muscles. 3. Skeletal muscles. 4. Cardiac muscles.

Practical-6B Study of ABO blood group and Rh factors.

Practical-7A To prepare a temporary slide of blood smear from human blood and study of blood cells (RBC, WBC and Platelets)

Practical-7B To solve genetic problem: Incomplete dominance.

Practical-8A To solve genetic problem: Codominance

Practical-8B To solve genetic problem: Polygenic inheritance.

Practical-9A To solve genetic problem: Lethal gene.

Practical-9B To solve genetic problem: Multiple alleles.

Practical-10A To solve genetic problem: Mendel's Monohybrid and Dihybrid ratio.

Practical-10B Study of glass wares and instruments used in animal tissue culture. Beaker, Pipette, Measuring Cylinder, Culture Flasks, Petri plates, Microscopic slides, Cover slips, Cell culture plates. Incubators, Centrifuge, Autoclave and pH meter.

Practical-11A Study of food chain and food web by chart or multimedia.

Practical- 11B Study of factor causing air and water pollution and their treatment by chart or multimedia.

Practical- 12A Study of factors causing soil and noise pollution and their treatment by chart or multimedia.

Practical- 12B Local excursion.



TEXT BOOKS RECOMMENDED FOR PAPER ZOCC-103 & ZOCC104

1. Text book of Zoology R. D. Vidyarthi
2. Animal Ecology S.P.Singh
3. Genetics. P.K. Gupta
4. EcologySarus Publication
5. Pranishastra (Gujarati) RaviPrakashan\
6. Jiv Vignan-2 (Gujarati) NiravPrakashan
7. A Text Bookof General Biology Tomer & Singh
8. Modern Text Book of Zoology(vertebrate) R.L.Kotpal
9. Modern Text Book of Zoology(invertebrate) R.L.Kotpal
10. Concept of Ecology N.Arumugam
11. Economic Zoology G.S.Shukla & V.B.Upadhyay
12. Pruthvanshi Praniyo ane Garbhvidya (Gujarati) A.B.Vyas
13. Utkrushtha Aprushthvanshi Praniyo (Gujarati) U.M.Rawal
14. Invertebrate Zoology E.L.Jordan & P.S.Verma
15. Prani Auotiki (Gujarati) Desai and Akhunji
16. Cell biology Genetics and Molecular Biology V.B. Rastogi
17. Molecular Biology and SarasPublication. Genetic Engineering
18. Cell and Molecular Biology Saras Publication.
19. Animal Diversity. Cleveland P. Hickman, Larry S Roberts, Susan L. Keen, Allan Larson, David Eisenhour. McGraw-Hill Higher Education, 2008.
20. Animal Diversity. Diana R. Kershaw. University Tutorial Press, 1984.
21. A Textbook of Invertebrate Zoology. Eylers. Mosby, Incorporated, 1991.
22. Laboratory Studies in Animal Diversity. Cleveland P. Hickman, Lee B. Kats. McGraw-Hill, 2008.
23. Digital Zoology: Version 2.0 CD-RO Mand Student Workbook. Jon G. Houseman. McGraw- Hill, 2003.
- 24 Laboratory Studies- Cleveland P. Hickman, Lee B. Kats, William C. Ober. in Animal Diversity. McGraw-Hill, 2006.
25. Glencoe Science Modules: Lucy Daniel, Dinah Zike. McGraw-Hill, Student Edition. Life Science, Animal 2007. Diversity,
26. Invertebrate Zoology: Edward E. Ruppert, Richard S. Fox, Robert D. Barnes. A Functional Evolutionary Thomson-Brooks/Cole, 2004. Approach.
27. Invertebrate Zoology: Robel1 L. Wallace, Walter Kingsley Taylor. A Laboratory Manual. Prentice Hall, 2002.
28. Vertebrate Zoology: Nelson G. Hairston. Cambridge University Press, 1994. An Experimental- Field Approach.
29. Paryavaran Adhyayan University Grants Commission, Oriental longman private limited.



MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY
(With effect from Academic Year 2020-2021)

B.Sc. (Zoology)
SEMESTER - II

Paper No.	Subject Code	Name Of The Paper	Total Marks Ext.+Int* = Total	Passing Standard Ext.+Int = Total	Total Teaching Hours	Exam Hours	Credits
ZOCC-203	22861	Diversity of Life, Cytology, Genetics, Ecology, Animal Pathology, and Economic Zoology.	70+30 =100	28+12 =40	15 WEEKS X 4 HOURS =60	2.5	04
ZOOC C-204	22862	Practical	50	28	15 WEEKS X 3 HOURS X 02 DAYS=90	03	02

INTERNAL

MARKS : 30



B.Sc. (Zoology)

SEMESTER – II

Paper ZOOCC-203

Code: 22861

Title of the Paper: Diversity of Life, Cytology, Genetics, Ecology, Animal Pathology and Economic Zoology.

Credits: 04

Marks: 70

Marks: Semester End Examination: 70 Marks

Internal: 30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
I	<p>Diversity of Life</p> <ul style="list-style-type: none">➤ Classification of phylum Annelida up to class with examples.➤ Classification of phylum Arthropoda up to class with examples.➤ Classification of phylum Mollusca up to class with examples.➤ Classification of phylum Echinodermata up to class with examples.➤ Classification of Chordata (Amphibia, Reptile, Aves and Mammals) up to sub classes with examples. <p>General Morphology and functional anatomy of Earthworm:</p> <ul style="list-style-type: none">➤ External character.➤ Body Wall.➤ Digestive system.➤ Reproductive system.➤ Nervous systems.➤ Septal Nephridia.➤ Blood Gland.➤ Setae.	15	18
II	<p>A. Cytology:</p> <ul style="list-style-type: none">➤ General idea of prokaryotic and eukaryotic cells.➤ Virus➤ Viroids➤ Prions➤ Mycoplasma➤ Ultramicroscopic structure of an animal cell.➤ Cell cycle.➤ Cell division: Mitosis.➤ Cytoskeleton - Structure and function: Microtubules, Microfilament and intermediate filament. <p>B. Genetics:</p> <p>Non allelic gene Interaction</p> <ul style="list-style-type: none">➤ Complementary genes (Flower colour in sweet pea)➤ Epistasis – Dominant (Colour pattern in poultry) <p>Sex linked inheritance:</p>	15	18



	<ul style="list-style-type: none">➤ X-linked genes (e.g. colour blindness in man, eye color in drosophila).➤ Sex limited characters inheritance (human and cattle)➤ Sex -influenced inheritance (Baldness in Man)➤ Y - linked genes (Holandric genes)		
III	<p>A Ecology:</p> <ul style="list-style-type: none">➤ Limiting factors of environment. <p>Aquatic habitats:</p> <ul style="list-style-type: none">➤ Fresh water: (i) Lentic (ii) Lotic <p>Marine water:</p> <ul style="list-style-type: none">➤ Characteristic of marine habitat.➤ Stratification of marine habitat. <p>Terrestrial habitats:</p> <ul style="list-style-type: none">➤ Deciduous forest eg. Gir forest.➤ Desert.➤ Grass land eg. BBNP.➤ Tundra.➤ Conifer.➤ General concept of Biodiversity of Gujarat and its Conservation measures. <p>(B) Animal Pathology:</p> <p>Diseases causing protozoans:</p> <ul style="list-style-type: none">• Plasmodium and types of Malaria.• <i>Trypanosoma cruzi</i>, <i>Trypanosoma brucei gambiense</i>• <i>Entamoeba histolytica</i>. <p>Diseases causing Nematodes:</p> <p><i>Ascaris lumbricoides</i>.</p> <p><i>Wuchereria bancrofti</i>.</p>	15	17
IV	<p>Economic Zoology:</p> <ul style="list-style-type: none">➤ Biological method of pest control.➤ Artificial insemination in cattle.➤ Economic importance of fisheries. <p>Apiculture: Types of honey bee, Indigenous method, Modern Method, Benefits and Drawbacks.</p> <p>Poultry: Importance of poultry, Poultry Breeds, Methods of Poultry Farming, feeding apparatus.</p> <p>Poultry disease:</p> <p>Bacterial disease:</p> <p>1. Puloram 2. Chronic Respiratory disease</p> <p>Viral disease:</p> <p>1. Fowl pox 2. Ranikhet</p> <p>Fungal disease:</p> <p>1. Aspargilloses 2. Afla-toxicosis</p> <p>Mosquitoes:</p> <ul style="list-style-type: none">➤ Lifecycle and mouth parts of Anopheles.➤ Lifecycle and mouth parts of Culex.	15	17



**B.Sc. (Zoology)
SEMESTER-II**

Paper ZOCC-204

Code: 22862

Title of the Paper: Zoology Practical

Credits: 02

Marks: Semester End Examination: 50 Marks

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOCC-203]

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (Secu.) dated: 31/10/06

All the topics for the practical are being taught by Models, Charts, Figures, Slides and multimedia.

Students have to prepare journals for Zoology Practicals.

Students have to submit certified journals in the University practical examination. There shall be Local Excursion/ Camp for Awareness and conservation of Biodiversity.

Detailed Syllabus for Zoology

Practical-1A To Study Bacteria and typical animal cell.

Classification of the following animals.

Practical-1B Classification of phylum Annelida and Arthropoda up to the classes:

Annelida : Nereis, Earthworm, Leech.

Arthropoda : Paripatus, Crab, Prawn, Centipede, Millipede, Bed bug, Grass hopper, Scorpion, Tick.

Practical-2A Classification of phylum Mollusca and Echinodermata up to the classes:

Mollusca : Chiton, Pila, Unio, Pearl oyster, Sepia, Dentalium.

Echinodermata: Starfish, Brittle star, Sea cucumber, Sea- lily, Sea-urchin.

Practical-2B Classification of class Amphibia and Reptiles up to order:

Amphibia : Ichthyophis, Toad, Salamander.

Reptiles : Chameleon, Turtle, Cobra, Krait, Saw scale Viper, Gavialis, Calotes.

Practical-3A Classification of class Aves up to the sub classes:

Aves : Archaeopteryx, Kingfisher, Hoopoe, Myna, Saras crane, House Sparrow.

Practical-3B Classification of class Mammals up to the sub classes:

Mammals: Duckbill Platypus, Spiny anteater, Kangaroo, Rabbit, Bat, Hedgehog, Rat.

Practical-4A To Study External characters of Earthworm by chart or multimedia.

Practical-4B To Study Digestive system of Earthworm by chart or multimedia.

Practical-5A To Study Reproductive system of Earth worm by chart or multimedia.

Practical-5B To Study Nervous system of Earth worm by char or multimedia.



- Practical-6A** To Study Temporary mountings ovary, Blood glands, setae, Septal Nephridia of Earthworm and T.S. passing through various body parts of Earth worm by permanent slides, charts, and multimedia.
- Practical-6B** To study Virus, Viroids, Prions, Mycoplasma by Multimedia
- Practical-7A** To solve genetic problem: Complementary genes (Flower colour in sweet pea).
- Practical-7B** To solve genetic problem: Dominant Epistasis (Colour pattern in poultry)
- Practical-8A** To solve genetic problem : X- linked genes (e.g. colour blindness in man, eye color in Drosophila)
- Practical-8B** To solve genetic problem : Inheritance of Sex limited characters (Human and Cattle)
- Practical-9A** To solve genetic problem: Sex –influenced inheritance (Baldness in Man)
- Practical-9B** To solve genetic problem : Y – linked genes (Holandric genes)
- Practical- 10A** To Study Lifecycle and mouth parts of Anopheles.
- Practical- 10B** To Study Lifecycle and mouth parts of Culex.
- Practical- 11A** To Study pathogenic Protozoa.
1. Plasmodium 2. Trypanosome 3. Entamoeba
- Practical- 11B** To Study pathogenic Nematodes.
1. Ascaris 2. Filaria worm
- Practical-12A** To Study different stages of mitosis by Permanent slides.
- Practical-12B** Ecological adaptations: Part I
Aquatic:1 Fresh water : Vorticella, Spongilla, Hydra, Pila, Ophiocephalus.
marine water: Noctiluca, Sea anemone, Aranicola, Loligo, Neries, Megalopa - larva, Chiton, Mudskipper.
Deep sea: Sole fish, Chimera.
- Practical-13A** Ecological adaptations: part II
Terrestrial : Toad and Jackal.
Arboreal : Chameleon, Parrot, and Draco.
Fossorial : Phrynosoma and Snake.
Volant : Bat and Crow.
- Practical-13B** To study animals of various forest habitats.
Deciduous forest animals: Lion, Leopard, Spotted deer and Blue bull.
Desert animals : Wild ass, Desert fox and Uromastrix.
Grass land animals : Blackbuck and Harrier.
- Practical-14A** To Study various types of poultry houses.
- Practical-14B** To Study various types of poultry breeds.
- Practical-15A** To Study various types of feeders used in poultry houses.
- Practical-15B** To prepare a bird list of College Campus / Uni. Campus.



TEXT BOOKS RECOMMENDED FOR PAPER ZOCC-203 & ZOCC-204

1. Text book of Zoology R. D. Vidyarthi
2. Animal Ecology S.P.Singh
3. Genetics. P.K. Gupta
4. EcologySaras Publication
5. Pranishastra (Gujarati) RaviPrakashan\
6. Jiv Vignan-2 (Gujarati) NiravPrakashan
7. A Text Bookof General Biology Tomer & Singh
8. Modern Text Book of Zoology(vertebrate) R.L.Kotpal
9. Modern Text Book of Zoology(invertebrate) R.L.Kotpal
10. Concept of Ecology N.Arumugam
11. Economic Zoology G.S.Shukla & V.B.Upadhyay
12. Pruthvanshi Praniyo ane Garbhvidya (Gujarati) A.B.Vyas
13. Utkrushtha Aprushthvanshi Praniyo (Gujarati) U.M.Rawal
14. Invertebrate Zoology E.L.Jordan & P.S.Verma
15. Prani Auotiki (Gujarati) Desai and Akhunji
16. Cell biology Genetics and Molecular Biology V.B.Rastogi
17. Molecular Biology and Genetic Engineering SarasPublication. Genetic Engineering
18. Cell and Molecular Biology Saras Publication.
19. Animal Diversity. Cleveland P. Hickman, Larry S Roberts,
Susan L. Keen, Allan Larson, David Eisenhour. McGraw- Hill Higher Education, 2008.
20. Animal Diversity. Diana R. Kershaw. University Tutorial Press, 1984.
Animal Diversity: A Textbook of Invertebrate Zoology.
Eylers. Mosby, Incorporated, 1991.
22. Laboratory Studies in Cleveland P. Hickman, Lee B. Kats.
McGraw-Hill Animal Diversity. Higher Education, 2008.
23. Digital Zoology: Version 2.0 CD-RO Mand Student Workbook. Jon G.
Houseman. McGraw- Hill, 2003.
24. Laboratory Studies- Cleveland P. Hickman, Lee B. Kats, William C. Ober.
in Animal Diversity. McGraw- Hill, 2006.
25. Glencoe Science Modules: Lucy Daniel, Dinah Zike. McGraw-Hill, Student Edition. Life
Science, Animal 2007. Diversity,
26. Invertebrate Zoology: Edward E. Ruppert, Richard S. Fox, Robert D.
Barnes. A Functional Evolutionary Thomson-Brooks/Cole, 2004
Approach.
27. Invertebrate Zoology: Robel L. Wallace, Walter Kingsley Taylor. A
Laboratory Manual. Prentice Hall, 2002.
28. Vertebrate Zoology: Nelson G. Hairston. Cambridge University Press,
1994. An Experimental- Field Approach.