



MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY
NAAC Accrediation Grade "B"
(With effect from Academic Year: 2016-17)

B.Sc. Zoology
SEMESTER - I

Syllabus for - UG B.Sc. Programmes
Course - CBCS

- 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 = 100 marks]
- Zoology Practical Examination shall be of 70 marks of 03 hours duration In University Examination.
- There shall be Two Semesters in an academic Year. (Semester-1 & 2)

Paper No.	Name Of The Paper	Total Marks Ext.+Int*= Total	Passing Standarad Ext.+Int = Total	Total Teaching Hours	Credits
ZOO-CC-101	Diversity of Life, General Morphology and functional anatomy, Genetics and Animal Biotechnology, Histology and Environmental Biology.	70+30 =100	28+12=40	15 WEEKS X 4 HOURS =60	04
ZOO-CC-102	Zoology practical	100	40	15 WEEKS X 6 HOURS =90	06

Continuous Internal Evaluation: **30 Marks**



3	<p>Genetics and Animal Biotechnology.(Animal cell culture)</p> <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 foetalis. - Polygenic inheritance (e.g. skin colour in humans). - Lethal Genes (e.g. yellow coat colour in mice, Thalassemia) <p>(B) Animal Biotechnology:</p> <ul style="list-style-type: none"> • Brief introduction & Definition • Fields of animal biotechnology • Some lab. Facilities needed for setting up a tissue culture laboratory <ul style="list-style-type: none"> - Glass wares - Autoclave <ul style="list-style-type: none"> ▪ pH meter 	12	14
4	<p>Study of mammalian Tissue system.</p> <p>Histological structure of the following organs:</p> <p>Stomach.</p> <ul style="list-style-type: none"> • Intestine. • Liver. • Pancreas. • Kidney. • Smooth Muscles. • Skeletal Muscles. • Cardiac Muscles. 	12	14
5	<p>Environmental Biology</p> <p>Pollution: A brief account of :</p> <ul style="list-style-type: none"> • Air pollution • Water pollution • Soil pollution • Noise pollution • Plastic pollution. <p>Adaptations.</p> <ul style="list-style-type: none"> • Terrestrial • Aquatic Primary and Secondary • Arboreal • Fossorial (Borrowings) • Volant Active flight and Passive Flight 	12	14

Continuous Internal Evaluation: **30 Marks**



B.Sc. Zoology
SEMESTER – I

Credit: 06

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – ZOO.-CC - 102

Title of the Paper: Zoology Practical

Marking Scheme: Semester End Examination: 100
TOTAL 100

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOO-CC-101]

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 the classes:

Practical –2A Classification of Phylum Protozoa.

Protozoa: Amoeba, paramecium, euglena, Arcella cerratium Plasmodium, Opalina

Practical – 2B Classification of Phylum Porifera to Coelenterata.

Porifera: Grantia, Hylonema, leucosolenia.

Coelenterata: Hydra, Sea-anemone, Jelly fish, physalia, Rhizostoma, Gorgonia, Coral.

Practical-3A Classification of Phylum Platyhelminthes and Nematelminthes.

Platyhelminthes: Liver fluke, Planaria, Tapeworm.

Nematelminthes: Guinea worm, Ascaris (Male & Female), Filaria.

Practical-3B Classification of Protochordata and Cyclostomata.

Protochordata: Ascidia, Amphioxus, Balanoglossus.

Cyclostomata: Lamprey.

Practical-4A Classification of super class Pisces (up to sub 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 Ecological adaptations.

Aquatic: 1 Fresh water: Vorticella, Spongilla, Hydra, Pila, Ophiocephalus.

2 marine water: Noctiluca, Sea anemone, Aranicola, Loligo, Neries, Megalopa-Larva, Chiton, Mudskipper.

3. Deep sea: Sole fish, Chimera.

Practical-7A Ecological adaptations.

Terrestrial: Toad, Jackal.

Arboreal: Chameleon, Parrot, Draco

Fossorial: Phrynosoma, Snake

Volant : Bat, Crow

Practical-7B Study of ABO blood group and Rh factors.

Practical-8A Study of human Blood cell (RBC, WBC and Platelets).

Practical-8B Genetic problem: Dominant alleles.

Practical-9A Genetic problem: Incomplete dominance.

Practical-9B Genetic problem: Co dominance.

Practical-10A Genetic problem: Polygenic inheritance.

Practical-10B Genetic problem: Lethal gene.

Practical-11B Genetic problem: Multiple alleles.

Practical-12A Mendel's dihybrid ratio.

Practical-12B To detect the pH from various samples.

Practical-13 Local excursion.

TEXT BOOKS RECOMMENDED FOR PAPER Zoo-101 & Zoo-102

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|---|---------------------------|
| 1. Text book of Zoology | R. D. Vidyarthi |
| 2. Animal Ecology | S.P.Singh |
| 3. Genetics. | P.K. Gupta |
| 4. Ecology | Sarus Publication |
| 5. Pranishastra (Gujarati) | Ravi Prakashan\ |
| 6. Jiv Vignan-2 (Gujarati) | Nirav Prakashan |
| 7. A Text Book of 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 |



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| 17. Molecular Biology and Genetic Engineering | Saras Publication. |
| 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. Animal Diversity: | A Textbook of Invertebrate Zoology,
Eylers. Mosby, Incorporated, 1991. |
| 22. Laboratory Studies in Animal Diversity | Cleveland P. Hickman, Lee B. Kats.
McGraw-Hill, 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
Diversity, 2007. |
| 26. Invertebrate Zoology: | Edward E. Ruppert, Richard S. Fox,
Robert D. Barnes. A Functional
Evolutionary Thomson-Brooks/Cole,
2004, Approach |
| 27. Invertebrate Zoology: | Robert 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 |



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B.Sc. Zoology
SEMESTER - II

Syllabus for - UG B.Sc. Programmes
Course - CBCS

Paper No.	Name Of The Paper	Total Marks Ext.+Int* = Total	Passing Standarad Ext.+Int = Total	Total Teaching Hours	Credits
ZOO- CC- 201	Diversity of Life, Cytology, Genetics, Animal biotechnology, Pathology, Ecology and Economic Zoology	70+30 =100	28+12 =40	15 WEEKS X 4 HOURS =60	04
ZOO - CC- 202	Practical	100	40	15 WEEKS X 3 HOURS X 02 DAYS=90	06

INTERNAL MARKS: 30



B.Sc. Zoology
SEMESTER – II

Credit: 04

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – ZOO.-CC - 201

Title of the Paper: Diversity of Life, Cytology, Genetics, Animal Biotechnology, Pathology, Ecology and Economics Zoology

Marking Scheme: Semester End Examination: 70
Internal Examination: 30
TOTAL 100

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	Diversity of Life <ul style="list-style-type: none">• Classification of phylum Annelida with examples.• Classification of phylum Arthropoda with examples.• Classification of phylum Mollusca with examples.• Classification of phylum Echinodermata with examples.• Classification of Chordata (Amphibia, Reptile, Aves and Mammals) up to sub classes with examples.• General Morphology and functional anatomy of Earth Warm:<ul style="list-style-type: none">• External character.• Body Wall,• Digestive system,• Reproductive system,• Nervous systems,• Septal Nephridia,• Blood Gland,• Setae.	12	14
2	A. Cytology: <ul style="list-style-type: none">• General idea of prokaryotic and eukaryotic cells.• Ultramicroscopic structure of an animal cell.• Cell division.• Endoplasmic reticulum• Golgi apparatus, synthesis and packaging.• Cell defense system – Lysosome.• Energy producing system – Mitochondria.• Nucleus. B. Genes & Animal biotechnology: <ul style="list-style-type: none">• Non allelic gene Interaction• Complementary genes (Flower colour in sweat pea)• Epistasis – Dominant (Colour pattern in poultry)	12	14



	<ul style="list-style-type: none"> • Sex linked inheritance • X- linked (e.g. colour blindness in man, eye color in drosophila) • Y – linked (Holandric genes) • Sex –influenced inheritance : • Baldness in Man • Animal biotechnology : • Some more labs facilities needed for setting up a tissue culture laboratory • Incubators • Centrifuges • Photo Electric Colorimeter • Introduction to genetics engineering in zoology • Introduction to nanotechnology in zoology 		
3	<p>Animal Pathology:</p> <ul style="list-style-type: none"> • Diseases causing protozoans: <ul style="list-style-type: none"> - Plasmodium and types of Malaria - Trypanosoma - Entamoeba • Diseases causing Nematodes: <ul style="list-style-type: none"> - Ascaris. - Guinea worm. - Filaria worm. • Diseases transmitting insects: <ul style="list-style-type: none"> - Lifecycle and mouth parts of Anopheles. - Lifecycle and mouth parts of Culex. 	12	14
4	<p>Ecology:</p> <ul style="list-style-type: none"> • Limiting factors of environment. • Aquatic habitats: <ul style="list-style-type: none"> - Fresh water: i. Lentic ii. Lotic - Marine water: • Characteristic of marine habitat. • Stratification of marine habitat. • Terrestrial habitats: <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. • Bird watching as a tool to understand environmental changes 	12	14



5	<p>Economic Zoology :</p> <ul style="list-style-type: none">• Biological method of pest control.• Economic importance of fisheries.• Apiculture: Types of honey bee, Indigenous method, Modern Method, Benefits and Drawbacks.• Poultry: Importance of poultry, Poultry Breeds, Methods of Poultry Farming, feeding apparatus Poultry disease. <p>A. Bacterial disease:</p> <ol style="list-style-type: none">1. Puloram2. Chronic Respiratory disease <p>B. Viral disease:</p> <ol style="list-style-type: none">1. Fowl pox2. Ranikhet <p>C. Fungal disease:</p> <ol style="list-style-type: none">1. Aspargilloses2. Afla-toxicosis <ul style="list-style-type: none">• Artificial insemination in cattle.	12	14
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TEXT BOOKS RECOMMENDED FOR PAPER Zoo-201 & Zoo-202

1. Text book of Zoology	R. D. Vidyarthi
2. Animal Ecology	S.P.Singh
3. Genetics	P.K. Gupta
4. Ecology	Sarus Publication
5. Pranishastra (Gujarati)	Ravi Prakashan\
6. Jiv Vignan-2 (Gujarati)	Nirav Prakashan
7. A Text Book of 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	Saras Publication
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. Animal Diversity:	A Textbook of Invertebrate Zoology. Eylers. Mosby, Incorporated, 1991
22. Laboratory Studies in Animal Diversity	Cleveland P. Hickman, Lee B. Kats.



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|---|---|
| 23. Digital Zoology: | McGraw-Hill Higher Education, 2008
Version 2.0 CD-RO Mand Student
Workbook. Jon G. Houseman. McGraw- Hill, 2003 |
| 24. Laboratory Studies-in Animal Diversity | Cleveland P. Hickman, Lee B. Kats, William C. Ober.
McGraw- Hill, 2006 |
| 25. Glencoe Science Modules: Life Science, Animal Diversity | Lucy Daniel, Dinah Zike. McGraw-Hill, Student
Edition, 2007. |
| 26. Invertebrate Zoology: | Edward E. Ruppert, Richard S. Fox, Robert D.
Barnes. |
| 27. A Functional Evolutionary Approach | Thomson-Brooks/Cole, 2004. |
| 28. Invertebrate Zoology: A Laboratory Manual: | Robel1 L. Wallace, Walter Kingsley Taylor,
Prentice Hall, 2002 |
| 29. Vertebrate Zoology: An Experimental Field Approach | Nelson G. Hairston. Cambridge University
Press, 1994 |



B.Sc. Zoology
SEMESTER – I

Credit: 06

Syllabus for – UG. B.Sc. Programmes Course – CBCS

Course No – ZOO.-CC - 202

Title of the Paper: Zoology Practical

Marking Scheme: Semester End Examination: 100
TOTAL 100

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOO-CC-202]

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

Classification of the following animals.

Practical-1A 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-1B 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-2A Classification of class Amphibia and Reptiles up to the sub classes:

Amphibia: Ichthyophis, Toad, Salamander.

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

Practical-2B Classification of class Aves up to the sub classes:

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

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

Mammals: Duckbill platypus, Spiny ant eater, Kangaroo, Rabbit, Bat, Hedge hog, Rat.

Practical-3B To Study External characters of Earthworm.

Practical-4A To Study Digestive system of Earthworm by charts, models and Multimedia

Practical-4B To Study Reproductive system of Earth worm by charts, models and Multimedia

Practical-5A To Study Nervous system of Earth worm by charts, models and Multimedia

Practical-5B To Study Temporary mountings of ovary, Blood glands, setae and Septal Nephridia, T.S. passing through various body parts of Earth worm by permanent slides, charts, models and Multimedia.

Practical-6A Genetic problem: Complementary genes (Flower colour in sweet pea).

Practical-6B Genetic problem: Dominant Epistasis (Colour pattern in poultry).

Practical-7A Genetic problem: X- linked (e.g. colour blindness in man)

Practical-7B Genetic problem: Y – linked (Holandric genes) Sex –influenced inheritance: Baldness in Man.



Practical- 8A To Study Lifecycle and mouth parts of Anopheles.

Practical- 8B To Study Lifecycle and mouth parts of Culex.

Practical- 9A To Study pathogenic Protozoans.

1. Plasmodium
2. Trypanosome
3. Entamoeba

Practical- 9B To Study pathogenic Nematodes.

1. Ascaris
2. Guinea worm
3. Filaria worm

Practical- 10A To Study different stages of mitosis by Permanent slides.

Practical-10B To study animals of various forest habitats.

Deciduous forest animals: Lion, Leopard, Spotted deer, Blue bull.

Desert animals: Wild ass, Desert fox, Uromastrix.

Grass land animals: Black buck, Harrier.

Practical-11A To Study various types of poultry houses.

Practical-11B To Study various types of poultry breeds.

Practical-12A To Study various types of feeders used in poultry houses.

Practical-12B To prepare a bird list of college campus / Uni. Campus.