



SIR P. T. SARVAJANIK COLLEGE OF SCIENCE, SURAT.
Autonomous
(Affiliated with Veer Narmad South Gujarat University)



Reaccredited 'A+' 3.35 CGPA by NAAC, *College with Potential for Excellence*

Sir P. T. Sarvajani College of Science

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Surat**

Re-Accredited 'A+' with CGPA 3.35

SYLLABUS

FOR

SEM II

Program: B. Sc.

Course: ZOOLOGY

For

Academic year

2024-25

(NEP-2020)

Effective from June 2024



F.Y.B. Sc. (Zoology)
SEMESTER II
(CREDITS: THEORY-3, PRACTICALS-1)

Course Title: Animal Diversity
COURSE CODE: ZOOMJ-S2P1-3CR24

THEORY [CREDITS - 03]

Animal Diversity and Ecology		
Course learning outcome		
After successfully completing this course, students will be able to:		
<ul style="list-style-type: none"> • Describe reproduction in protozoa. • Understand spicules in Porifera • Explain polymorphism in Cnidaria. • Describe parasitic adaptations of Platyhelminthes and Nematelminthes • Define metamerism. • Know metamorphosis in insect. • Understand and describe various ecological adaptations. 		
Module 1	Non-Chordate Amplifications	[10L]
Learning Objective		
Focused on specification of phylum Protozoa to Helminthes.		
Learning Outcomes:		
<ul style="list-style-type: none"> • Describe Reproduction in protozoa. • Understand spicules in Porifera • Explain Polymorphism. • Describe parasitic adaptations of Platyhelminthes and Nematelminthes. 		
1.1	<ul style="list-style-type: none"> • Phylum Protozoa: Reproduction • Phylum Porifera: Spicules • Phylum Cnidaria: Polymorphism • Phylum Platyhelminthes and Nematelminthes: Parasitic adaptations 	[10L]
Module 2	Non-Chordate Amplifications	[10L]
Learning Objective		
Focused on specification of phylum Annelida to Echinodermata.		
Learning Outcomes:		
<ul style="list-style-type: none"> • Define metamerism. 		



	<ul style="list-style-type: none">• Know metamorphosis in insect.• Diversity of mollusca shell.• Water vascular System in star fish.	
2.1	<ul style="list-style-type: none">• Phylum Annelida: Metamerism• Phylum Arthropoda: Metamorphosis in Insects• Phylum Mollusca: Shell in Mollusca• Phylum Echinodermata: Water vascular system in Asteroidea	[10L]
Module 3	Ecological Adaptations	[10L]
Learning Objective: Types of adaptation in Animals.		
Learning Outcomes: Understand and describe various ecological adaptations.		
3.1	<ul style="list-style-type: none">• Aquatic adaptations• Arboreal adaptations• Volant adaptations• Desert adaptations	
References: <ol style="list-style-type: none">1. Ruppert and Barnes, R.D. (2006). <i>Invertebrate Zoology</i>, VIII Edition. Holt Saunders International Edition.2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). <i>The Invertebrates: A New Synthesis</i>, III Edition, Blackwell Science.3. Invertebrate Zoology- E.L.Jordan & P.S.Verma.4. Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.5. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.6. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.7. Modern zoology –Dr. Ramesh Gupta, Prakash Publication, 12th Edition, Muzaffarnagar (UP)8. Ruppert and Barnes, R.D. (2006). <i>Invertebrate Zoology</i>, VIII Edition. Holt Saunders International Edition.9. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). <i>The Invertebrates: A New Synthesis</i>, III Edition, Blackwell Science10. Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.11. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.12. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.		



Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Describe reproduction in protozoa.		√				
Understand spicules in Porifera	√					
Explain polymorphism in Cnidaria.		√				
Describe parasitic adaptations of Platyhelminthes and Nematelminthes		√				
Define metamerism.	√					
Know metamorphosis in insect.	√					
Understand and describe various ecological adaptations.	√					

F.Y.B. Sc. (Zoology)

SEMESTER II

(CREDITS: THEORY-3, PRACTICALS-1)

Course Title: Evolution, Ethology and Type Study

COURSE CODE: ZOOMJ-S2P2-3CR24

THEORY [CREDITS - 03]

Evolution, Ethology and Type Study

Course learning outcome

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

- Define and describe evolutions.
- Identify homologous organs, analogous organs and vestigial organs.
- Describe patterns of behavior.
- Explain nesting behavior in birds.
- Understand different system of scoliodon.
- Explain different system of scoliodon.

Module 1 **Evolution and Ethology** **[10L]**

Learning Objective:

Evolution,

Learning Outcomes:



CO1: Define and describe evolutions. CO2: Identify homologous organs, analogous organs and vestigial organs.		
1.1	Evolution <ul style="list-style-type: none"> • Homologous organs • Analogous organs • Connecting link • Vestigial organs 	
Module 2	Ethology	[10L]
Learning Objective Behaviour, Pattern of behaviour		
Learning Outcomes: CO1: Describe patterns of behavior. CO2: Explain nesting behavior in birds.		
2.1	Ethology: <ul style="list-style-type: none"> • Introduction, Scope and patterns of behaviour • Nesting behaviour (Weaver bird, Horn bill) and Social behaviour (termites) 	[10L]
Module 3	Type study-Scoliodon	[10L]
Learning Objective Type study of Scoliodon		
Learning Outcomes: CO1: Understand different system of scoliodon. CO2: Explain different system of scoliodon.		
3.1	<ul style="list-style-type: none"> • External characters • Digestive system • Respiratory System • Circulatorysystem • Urinogenital system • Brain 	
References: <ol style="list-style-type: none"> 1. Kardong, K.V. (2005) <i>Vertebrates' Comparative Anatomy, Function and Evolution</i>. IV Edition. McGraw-Hill Higher Education. 2. Kent, G.C. and Carr R.K. (2000). <i>Comparative Anatomy of the Vertebrates</i>. IX Edition. The McGraw-Hill Companies. 3. Young, J. Z. (2004). <i>The Life of Vertebrates</i>. III Edition. Oxford University press. 4. Modern Text Book of Zoology (vertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India. 5. Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India. 6. Kardong, K.V. (2005) <i>Vertebrates' Comparative Anatomy, Function and Evolution</i>. IVth Edition. McGraw-Hill Higher Education. 		



7. Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies
8. Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford University Press.
9. Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
10. Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Define and describe evolutions.	√					
Identify homologous organs, analogous organs and vestigial organs.		√				
Describe patterns of behavior.		√				
Explain nesting behavior in birds.		√				
Understand different system of scoliodon.	√					
Explain different system of scoliodon.		√				

F.Y.B. Sc. (Zoology)
SEMESTER II
(CREDITS: PRACTICALS-1)

Course Title: Zoology Practical MJ-201

COURSE CODE: ZOOMJ-S2PR1-1CR24

Practical Credit- 01

Course Learning Outcome
<p>After the successful completion of the Course, the learner will be able to:</p> <ul style="list-style-type: none"> • Describe reproduction in protozoa. • Understand spicules in porifera • Explain types of Polymorphism • Describe parasitic adaptations of Platyhelminthes and Nematelminthes • Define metamerism. • Know metamorphosis in insect. • Understand and describe various ecological adaptations.
<p>ZOOLOGY PRACTICAL Module – I (Based on ZOOMJ-S2PR1-1CR24) [10L]</p>
The following Practicals are to be taught/studied only with the help of charts, models, videos,



photographs, permanent slides, working models etc.

1	Protozoa: To study Reproduction in Paramecium, Amoeba, Euglena, Monocystis
2	Porifera: To study spicules and gemmules in Sponge spicules, gemmules
3	Cnidaria: Polymorphism
4	Platyhelminthes and Nematelminthes: To study parasitic adaptation of Tapeworm and Round worm
5	Annelida: To study Metamerism: Leech, Earthworm
6	Arthropoda: To study Metamorphosis in Insects: <i>Bombax mori</i>
7	Mollusca: To study various types of Shell in Mollusca: Sepia, Pila, Pearl oyster
8	Echinodermata: Water vascular system in Asteroidea
9	Study of Ecological adaptations: (a) Arboreal adaptations – Chameleon, Squirrel (b) Volant adaptations - Flying fish, Draco (c) Desert adaptations – Camel, Phrynosoma (d) Aquatic adaptations - Flat fish, Sucker fish

PRACTICAL Module – II

(Based on ZOOMJ-S2PR2-1CR24– II)

Zoology Practical Credit -01

[10L]

- Define and describe evolutions.
- Identify homologous organs, analogous organs and vestigial organs.
- Describe patterns of behaviour.
- Explain nesting behaviour in birds.
- Understand different system of scoliodon.
- Explain different system of scoliodon.

1	Study of Ecologicaladaptations: <ul style="list-style-type: none"> • Arboreal adaptations: Chameleon, Squirrel • Volant adaptations: Flyingfish, Draco • Desert adaptations: Camel, Phrynosoma • Aquaticadaptations: Flatfish,Suckerfish
2	To study Evolution: <ul style="list-style-type: none"> • Homologus organs: Forelimbs and hindlimbs of chordates



	<ul style="list-style-type: none"> • Analogous organs: Wings of butterfly, Birds and Bats • Connecting link: Duckbill Platypus, Peripatus, Aechmopteryx • Vestigial organs: Caecum and Vermiform appendix in man, Hindlimbs in python, Leg in whale 	
3	<p>To study nesting behavior and social behaviour:</p> <ul style="list-style-type: none"> • Weaverbird • Hornbill • Termites: Queen, Drones, Workers, Soldiers 	
4	<p>To study in Scoliodon</p> <p>1. External features and Systems</p> <ul style="list-style-type: none"> • Digestive system • Male and Female Urinogenital system • Brain (Dorsal and ventral view) <p>2. Mounting</p> <ul style="list-style-type: none"> • Placoid scales • Ampulla of Lorenzini 	

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Describe reproduction in protozoa.		√				
Understand spicules in porifera	√					
Explain types of Polymorphism		√				
Describe parasitic adaptations of Platyhelminthes and Nematelminthes		√				
Define metamerism.	√					
Know metamorphosis in insect.	√					
Understand and describe various ecological adaptations.	√	√				
Define and describe evolutions.	√	√				
Identify homologous organs, analogous organs and vestigial organs.		√				
Describe patterns of behavior.		√				
Explain nesting behavior in birds.		√				
Understand different system of scoliodon.	√	√				
Explain different system of scoliodon		√				



SEMESTER II
(CREDITS: THEORY-2, PRACTICALS-2)

Course Title: Ecology and Wildlife Biology

COURSE CODE: ZOOMN-S2P1-2CR24

THEORY [CREDITS - 02]

Ecology and Wildlife Biology		
Course learning outcome		
After successfully completing this course, students will be able to:		
<ul style="list-style-type: none">• Define adaptations• Understand and describe various ecological adaptations.• Define wildlife.• Give difference between national parks and sanctuary.• Explain difference between national parks and sanctuary.		
Module 1	Ecological Adaptations	[10L]
Learning Objective		
Types of adaptations		
Learning Outcomes:		
CO: 01 Define adaptations		
CO: 02 Understand and describe various ecological adaptations.		
1.1	<ul style="list-style-type: none">• Aquatic adaptations• Arboreal adaptations• Volant adaptations• Desert adaptations	[10L]
Module 2	Wildlife biology	[10L]
Learning Objective		
Wildlife of Gujarat.		
Learning Outcomes:		
<ul style="list-style-type: none">• Define wildlife.• Give difference between national parks and sanctuary.• Explain difference between national parks and sanctuary.		
2.1	<ul style="list-style-type: none">• Introduction, National Parks and Sanctuaries of Gujarat –• Gir National Parks and Sanctuaries• Marine National Parks and Sanctuaries• Nal Sarovar Bird Sanctuary• Purna Sanctuary	[6L]



• Vansda National Parks

References:

1. Shukla, G.S. & Upadhyay, V.B. Economic Zoology. Rastogi Publi. 2005, 487 pages.(For Poultry)
2. JawaidAhsan, Sinha, S. P. 2008. A Handbook of Economic Zoology. S. Chand and Co. Publ. 272 pages.(For Poultry)
3. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
4. Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*.IVthEdition.McGraw-Hill Higher Education.
5. Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*.
6. IX Edition.The McGraw-Hill Companies
7. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
8. Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford University press.
9. Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
10. Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
11. Invertebrate Zoology- E.L. Jordan & P.S.Verma
12. Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
13. A Text Book of Histology – Leslie P. Gartner-4thedi.-Amazone
14. Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
15. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
16. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
17. Ecology, Cell biology, Genetics, Animal diversity, Animal Physiology, Immunology, Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Define adaptations	√					
Understand and describe various ecological adaptations.	√	√				
Define wild life.	√					
Explain difference between national parks and sanctuary.		√				



F.Y.B. Sc. (Zoology)
SEMESTER II
(CREDITS: PRACTICALS-2)

Course Title: Zoology Practical

COURSE CODE: ZOOMN-S2PR1-2CR24

Practical Credit- 02

Course Learning Outcome

After the successful completion of the Course, the learner will be able to:
CO: 01 Demonstrate practical skills.
CO: 02 Understand and describe various ecological adaptations.
CO: 03 Give difference between national parks and sanctuary.

PRACTICAL Module (Based on ZOOMN-S2PR1-2CR24)

The following practical's are to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models etc.

1	<p>Study of Ecological adaptations:</p> <ul style="list-style-type: none"> • Arboreal adaptations: Chameleon, Squirrel • Volant adaptations: Flyingfish, Draco • Desert adaptations: Camel, Phrynosoma • Aquatic adaptations: Flatfish, Suckerfish
2	<p>Study of national parks and Sanctuaries:</p> <ul style="list-style-type: none"> • Gir National Park • Marine National Park • Vansda National Park • Velavadar National Park • Wild ass Sanctuary • Thol Sanctuary

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Demonstrate practical skills.			√			
Understand and describe various ecological adaptations.	√	√				
Give difference between national parks and sanctuary.			√			



F.Y.B. Sc. (Zoology)
SEMESTER II
Course Title: Aqua Culture
COURSE CODE: ZOOMDC-S2P1-2CR24
THEORY [CREDITS - 02]

Aqua Culture		
Course learning outcome		
After successfully completing this course, students will be able to:		
<ul style="list-style-type: none">• Define aquaculture.• Identify different species of prawn.• Know methods of prawn fishing.• Describe preservation and processing methods of prawn.• Identify major carps.• Describe major carps.		
Module 1	Prawn Culture	[10L]
Learning Objective		
Detail about of prawn culture.		
Learning Outcomes:		
CO1: Define aquaculture. CO2: Identify different species of prawn.		
1.1	Habit and Habitats of prawns, Species of prawns – <ul style="list-style-type: none">• Tiger prawn• White prawn• Banana prawn• Macrobrachium rosenbergii	[10L]
Module 2	Major Carp Culture	[10L]
Learning Objective		
Edible Carp culture methods.		
Learning Outcomes:		
CO1: Identify major carps. CO2: Describe major carps.		
2.1	Study of <ul style="list-style-type: none">• Catla catla• Labeo rohita• Cirrihina mrigala	[10L]
References:		
<ol style="list-style-type: none">1. An Introduction to fishes-S.S.Khanna.2. Fish and Fisheries of India-V.G.Jhingran.		



3. Fish and Fisheries –A.R.Shukla
4. Fish and Fisheries-B.N.Yadav.
5. Ichthyology-Lagler,Bardach,Passino & Miller
6. Fundamentals of Ichthyology-Gupta,Guhalwat,Yadav,Jain
7. Fundamentals of Ichthyology-S.P.Biswas
8. General and Applied Ichthyology-S.K.Gupta,P.C.Gupta.
9. An Introduction to fishes-G.S.Sandhu.
10. Fish Biology-C.B.L.Srivastava
11. A Textbook of Fish Biology and Fisheries- S.S.Khanna and H.R.Singh

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Define aquaculture.	√					
Identify different species of prawn.		√				
Know methods of prawn fishing.	√					
Describe preservation and processing methods of prawn.		√				
Identify major carps.		√				
Describe major carps.		√				

F.Y.B. Sc. (Zoology)

SEMESTER II

Course Title: MDC- Zoology Practical

COURSE CODE: ZOOMDC-S2PR1-2CR24

Practical [CREDITS - 02]

Course Learning Outcome

After the successful completion of the Course, the learner will be able to:

CO1: Define aquaculture.

CO2: Identify different species of prawn.

CO3: Know methods of prawn fishing.

CO4: Describe preservation and processing methods of prawn.

CO5: Identify major carps.

CO6: Describe major carps.

PRACTICAL Module – I (Based on ZOOMDC-S2PR1-2CR24) [10L]

The following practicals are to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models etc.



1	To identify different prawn species with the help of specimen/charts/photographs: Tiger prawns, White prawns, Banana prawns, Macrobrachium rosenbergii	
2	To identify Major Carps	

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Define aquaculture.	√					
Know methods of prawn fishing.	√					
Describe preservation and processing methods of prawn.		√				
Identify major carps.		√	√			

F.Y.B. Sc. (Zoology)

SEMESTER II

Course Title: Poultry Framing

COURSE CODE: ZOOSec-S2P1-2 CR24

THEORY [CREDITS - 02]

Poultry Farming		
Course learning outcome		
After successfully completing this course, students will be able to: CO1: Know and understand history, scope and importance of Poultry Farm CO2: Explain different types of poultry housing system. CO3: Describe Indian and exotic breeds of poultry. CO4: Understand different poultry appliances and its uses.		
Module 1	Introduction	[10L]
Learning Objective		
Introduction, Construction and Management of Poultry.		
Learning Outcomes:		
CO1: Know and understand history, scope and importance of Poultry Farm CO2: Explain different types of poultry housing system.		
1.1	<ul style="list-style-type: none"> • Introduction, history and importance of poultry farming • Construction of poultry housing systems systems 	[10L]



	<ul style="list-style-type: none"> • Types of poultry housing systems • Poultry management and factor involved in poultry management 	
Module 2	Breeds, Appliances and Significance	[10L]
Learning Objective Different breeds of poultry & appliances used in poultry farming.		
Learning Outcomes: CO1: Describe Indian and exotic breeds of poultry. CO2: Understand different poultry appliances and its uses.		
2.1	<ul style="list-style-type: none"> • Indian Breeds of poultry • Exotic Breeds of poultry • Care of egg laying hen • Traditional method of poultry appliances: Brooder, Feeder, Water Appliances • Modern method of poultry appliances: Brooder, Feeder, Water Appliances • Excreta as manure • Use of Poultry feathers 	[10L]
References:		
<ol style="list-style-type: none"> 1. Economic Zoology: G.S. Shukla & V.B. Upadhyay, Rastogi Publication, Meerut. 2. https://www.pashudhanpraharee.com/types-of-poultry-housing-systems/ 3. https://www.agrifarming.in/poultry-housing-types-equipment-and-construction 4. https://www.fao.org/3/i3531e/i3531604.pdf 		

Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Know and understand history, scope and importance of Poultry Farm	√					
Explain different types of poultry housing system.		√				
Describe Indian and exotic breeds of poultry.		√				
Understand different poultry appliances and its uses.		√				
Know and understand history, scope and importance of Poultry Farm	√					