



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*

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# **Sir P. T. Sarvajani College of Science**

**Autonomous**

**Affiliated to Veer Narmad South Gujarat University, Surat**

**Re-Accredited 'A+' with CGPA 3.35**

**SYLLABUS**

**FOR**

**SEM I**

**Program: B.Sc.**

**Course: ZOOLOGY**

**For**

**Academic year**

**2024-25**

**(NEP-2020)**

**Effective from June 2025**



## Board of Studies in Zoology

### Undergraduate and Post graduate

	Name	Designation	Institute/Industry
<b>Head of the Department</b>			
1	Dr. Jaya Patel	Chairperson	Sir P. T. Sarvajani College of Science
<b>Two experts from other than the parent University</b>			
1	Dr. Nikunj Bhatt	Associate Professor	Department of Zoology, V. P. & R. P. T. P. Science College, (Autonomous), Vallabh Vidyanagar, Anand
2	Dr. Amol Patwardhan	Assistant Professor	K. J. Somaiya College of Science and Commerce (Autonomous), Mumbai
<b>Subject Expert nominated by Vice-Chancellor</b>			
1	Dr. Krupal Patel	Assistant Professor	Department of Zoology, Govt. Arts, Commerce & Science College, Limbayat, Surat
<b>Meritorious Alumnus</b>			
1	Mr. Bhavesh Chevli	Chief of Manufacturing	Envision Scientific Pvt. Ltd Sachin-Hazira Road
<b>Experts from outside the Autonomous College, whenever special courses of studies are to be formulated, to be nominated by the Principal.</b>			
1	Dr. Arun Dholakia	Retd. Associate professor	Department of Zoology, Sir P.T.Sarvajani College of Science, Surat
<b>Representative from Industry/corporate sector/allied area</b>			
1	Ms. Pinal Patel	Board of Member	TINSA, Ecological Foundation Bhopal, Madhya Pradesh
<b>Faculty of the specialization</b>			
1	Dr. Jaya Patel	Associate Professor & Head	Sir P. T. Sarvajani College of Science, Surat
2	Dr. Nitin Solanki	Assistant Professor	Sir P. T. Sarvajani College of Science, Surat
3	Dr. Neelam Mishra	Adhyapak Sahayak	Sir P. T. Sarvajani College of Science, Surat e



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## Acknowledgement

At the outset, I would like to thank our, Principal Dr. Pruthul R. Desai for his guidance and support during the curriculum restructuring process. I am also grateful to all the esteemed members of the Board of Studies, for their constructive suggestions and contributions.

Above all, I am deeply indebted to all the young and vibrant colleagues in the Department of Zoology for the long and arduous work they have put in during the compiling of the restructured syllabus.

**Dr. Jaya M. Patel**  
**Chairperson**  
**Board of Studies in Zoology**



## Graduate Attributes (GA)

After the successful completion of modules in different courses of B. Sc., the learner will be able to:

- Continue life-long learning as an autonomous learner
- Continuously strive for excellence in education
- Apply and nurture critical and creative thinking
- Promote sustainable development practices
- Promote co-operation over competition
- Balance rights with responsibilities
- Understand and respect diversity & difference
- Not be prejudiced by gender, age, caste, religion, or nationality.
- Use education as a tool for emancipation and empowerment of humanity

## Programme Outcomes (PO)

**PO1** - Students gain knowledge and skill in the fundamentals of animal sciences,

**PO2**- Understands the complex interactions among various living organisms.

**PO3** – Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.

**PO4** – Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.

**PO5** – Understands the complex evolutionary processes and behaviour of animals.

**PO6** – Correlates the physiological processes of animals and relationship of organ systems.

**PO7** – Understanding of environmental conservation processes, protection of endangered species and its importance.

**PO8** – Apply the knowledge to explore small scale business like sericulture, aquaculture, apiculture, vermiculture, animal husbandry and poultry farm.

**PO9** – Understands about various concepts of genetics and its importance in human health.

**PO10** – Apply the knowledge and understanding of Zoology to one's own life and work.

**PO11** – Develops empathy and love towards the animals.



## Content

Sr. No	Semester	Course number	Course Code	Course Name
<b>Core Course (CC)</b>				
1	I	MJ: CC I	ZOOMJ-S1P1-3CR25	Non Chordates I
2		MJ:CC II	ZOOMJ-S1P2-3CR25	Chordates I and Ecology
3		MJ: Practical-I	ZOOMJ-S1PR1-1CR25	Zoology Practical -I
4		MJ: Practical-II	ZOOMJ-S1PR2-1CR25	Zoology Practical -II
5		MN: CCI	ZOOMN-S1P1-2CR25	Non Chordates & Chordates
6		MN: Practical-I	ZOOMN-S1PR1-2CR25	Zoology Practical -I
7		MDC-I	ZOOMDC-S1P1-4CR25	Human Health and Diseases
8		SEC-I	ZOOSec-S1P1-2CR25	Aquarium Management



**Detailed B. Sc. Zoology Syllabus**

**F. Y. B. Sc. Syllabus with effect from the Academic year 2024-25**

Course No.	Course Title	Course Code	Credits	Hour	Module	Lectures per module (1 Hr)	Examination		
							Internal Marks	External Marks	Total Marks
<b>SEMESTER I</b>									
<b>Major Courses THEORY and PRACTICAL</b>									
MJ: CC I	Non Chordates I	ZOOMJ-S1P1-3CR25	3	45	3	15	37	38	75
MJ:CC II	Chordates I and Ecology	ZOOMJ-S1P2-3CR25	3	45	3	15	37	38	75
MJ: PRACTICAL-I	Zoology Practical MJ-I	ZOOMJ-S1PR1-1CR25	1	30	1	15	12	13	25
MJ: PRACTICAL-II	Zoology Practical MJ-II	ZOOMJ-S1PR2-1CR25	1	30	1	15	12	13	25
MN: CCI	Non-Chordates & Chordates	ZOOMN-S1P1-2CR25	2	30	2	15	25	25	50
MN: Practical-I	Zoology Practical -I	ZOOMN-S1PR1-2CR25	2	60	2	15	25	25	50
MDC-I	Human Health and Diseases	ZOOMDC-S1P1-4CR25	4	60	4	15	50	50	100
SEC-I	Aquarium Management	ZOOSSEC-S1P1-2CR25	2	60	2	30	25	25	50
VAC	Environmental Studies	ENV-S1P1-2CR25	2	30	2	15	25	25	50



**F.Y.B. Sc. (Zoology)**  
**SEMESTER I**  
**MJ:CC I**  
(CREDITS: THEORY-3, PRACTICALS-1)

**Course Name: Non Chordates I**

**COURSE CODE: ZOOMJ-S1P1-3CR25**

**THEORY [CREDITS - 03]**

<b>Course learning outcome</b>		
After successfully completing this course, students will be able to:		
<ul style="list-style-type: none"> <li>• Know various disciplines of zoology.</li> <li>• Explain general characters of invertebrate phyla.</li> <li>• Identify difference animals of difference phylum.</li> <li>• Know and explain difference system of liver fluke.</li> <li>• Understand and explain pathogenicity and parasitic adaptations of liver fluke.</li> </ul>		
<b>Module 1</b>	<b>Basics of Zoology and General characteristics of Non- Chordate Phyla</b>	<b>[10L]</b>
<b>Learning Objective</b>		
<ul style="list-style-type: none"> <li>• Differentiate animals as per taxonomy.</li> </ul>		
<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Know various disciplines of zoology.</li> <li>• Explain general characters of invertebrate phyla.</li> </ul> Differentiate different animals as per their phylum.		
<b>1.1</b>	<b>Scope, Disciplines and Career in Zoology.</b>	<b>[4L]</b>
<b>1.2</b>	<b>General characteristics of Non Chordate Phyla:</b> <ul style="list-style-type: none"> <li>• Protozoa,</li> <li>• Porifera,</li> <li>• Cnidaria,</li> <li>• Platyhelminthes,</li> <li>• Aschelminthes,</li> <li>• Annelida.</li> </ul>	<b>[6L]</b>
<b>Module 2</b>	<b>General Characteristics of Non Chordate Phyla</b>	<b>10L</b>
<b>Learning Objective</b>		
Ensure acquiring the awareness on the basics of the zoology and to understand the different features and diversities of Non chordates		
<b>Learning Outcomes:</b>		



Understand the general taxonomic rules on animal classification, the principles and methods of taxonomy.		
<b>2.1</b>	<b>General Characteristics of Non- Chordate Phyla:</b> <ul style="list-style-type: none"><li>• Arthropoda</li><li>• Mollusca</li><li>• Echinodermata</li><li>• Hemichordata</li></ul>	<b>[10L]</b>
<b>Module 3</b>	<b>Non Chordate animal type study: <i>Fasciola hepatica</i> (Liver Fluke)</b>	<b>[10L]</b>
<b>Learning Objective</b> <ul style="list-style-type: none"><li>• Systematic position of liver fluke and detail study of different systems of liver fluke.</li></ul>		
<b>Learning Outcomes:</b> <ul style="list-style-type: none"><li>• Describe the morphology, habit and habitat of liver fluke.</li><li>• Systematic position and various systems in Liver fluke.</li></ul>		
<b>3.1 <i>Fasciola hepatica</i> (Liver Fluke):</b> <ul style="list-style-type: none"><li>• Systematic position, habit and habitat</li><li>• External features, body wall</li><li>• Digestive system</li><li>• Respiratory system</li><li>• Excretory system</li><li>• Nervous system,</li><li>• Reproductive system</li><li>• Life cycle and development pathogenesis, parasitic adaptations.</li></ul>		
<b>References:</b> <ol style="list-style-type: none"><li>1. Ruppert and Barnes, R.D. (2006). <i>Invertebrate Zoology</i>, VIII Edition. Holt Saunders International Edition.</li><li>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</li><li>3. Modern Text Book of Zoology (invertebrate) R.L.Kotpal,Rastogi Publication, Meerut, India.</li><li>4. Invertebrate Zoology- E.L.Jordan &amp; P.S.Verma</li><li>5. Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.</li><li>6. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand &amp; Co. Ltd. New Delhi, India.</li><li>7. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand &amp; Co. Ltd. New Delhi, India.</li><li>8. Modern zoology –Dr. Ramesh Gupta,Prakash Publication,12<sup>th</sup> Edition, Muzaffarnagar (UP)</li><li>9. Ruppert and Barnes, R.D. (2006). <i>Invertebrate Zoology</i>, VIII Edition.Holt Saunders International Edition.</li><li>10. 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</li></ol>		



11. Modern Text Book of Zoology (invertebrate) R. L. Kotpal, Rastogi Publication, Meerut, India.

**Course Name: Non Chordates I**

**COURSE CODE: ZOOMJ-S1P1-3CR25**

**Question paper Template**

Unit	Remembering (1)	Understanding (2)	Applying (3)	Analyzing (4)	Evaluating (5)	Creating (6)	Total
I	45%	55%	-	-	-	-	100%
II	45%	55%	-	-	-	-	100%
III	20%	60%	20%	-	-	-	100%

**Mapping of COs and POs**

Course Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Know various disciplines of zoology.	√					
Explain general characters of invertebrate phyla.		√				
Identify and difference animals of difference phylum.			√			
Know and explain difference system of liver fluke.		√				
Understand and explain pathogenicity and parasitic adaptations of liver fluke.		√				



**F.Y. B. Sc. (Zoology)**  
**SEMESTER I**  
**MJ: CC II**

**Course Name: Chordates I and Ecology**

**COURSE CODE: ZOOMJ-S1P2-3CR25**

**THEORY [CREDITS – 03]**

**Course learning outcome**

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

- Know and explain general characteristics of vertebrate.
- Identify the taxonomic status and evolutionary significance of entire chordates.
- Impaired the knowledge on ecological adaptations.
- Identify and explain scales of Pisces.
- Identify venomous & non-venomous snakes.
- Draw and know different types of beak and feet structure of birds.
- Differentiate prototheria, metatheria & eutheria.
- Understand basic of ecology.
- Explain and draw types of ecosystem.
- Describe importance of ecosystem.

<b>Module 1</b>	<b>Chordates General Characteristics</b>	<b>[10L]</b>
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**Learning Objective**

Taxonomy of Chordates from Protochordates to class Mammals.

**Learning Outcomes:**

- This course is intended to provide students with a fundamental grasp of the diversity of the Phylum Chordata with a focus on their origin, major traits, classification, distribution, and functioning.
- This course will enlighten students on the concept of chordate diversity, organisation, adaptation, and taxonomic position.

<b>1.1</b>	<b>General Characteristics of Chordates:</b>	<b>[10L]</b>
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- Protochordates
- Pisces
- Amphibian
- Reptiles
- Aves
- Mammals

<b>Module 2</b>	<b>Chordate Amplifications</b>	<b>[10L]</b>
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**Learning Objective:**

Specification of each class or phylum.



<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Identify and classify different animals of vertebrate class.</li> <li>• Know and explain scales of Pisces.</li> <li>• Identify venomous &amp; non-venomous snakes.</li> <li>• Differentiate venomous and non-venomous snakes characteristics.</li> <li>• Draw and explain different types of beak and feet of birds.</li> </ul>		
<b>2.1</b>	<ul style="list-style-type: none"> <li>• Pisces - Types of scales</li> <li>• Amphibia - Parental care</li> <li>• Reptiles – Venomous and Non-Venomous snakes</li> <li>• Aves – Modification of beak and feet</li> <li>• Mammals – Salient features of Prototheria, Metatheria and Eutheria</li> </ul>	<b>[10L]</b>
<b>Module 3</b>	<b>Ecology</b>	<b>[10L]</b>
<b>Learning Objective:</b>		
<ul style="list-style-type: none"> <li>• Fundamentals of Ecology</li> <li>• Types of Ecosystems</li> </ul>		
<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Know basic of Ecology</li> <li>• Explain types of Ecosystems and its importance</li> </ul>		
<b>3.1</b>	<p><b>Basics of Ecology:</b></p> <ul style="list-style-type: none"> <li>• Definition and Concept of Ecology</li> <li>• Scope of Ecology</li> <li>• Biotic and Abiotic Components.</li> <li>• Types of Ecosystems               <ul style="list-style-type: none"> <li>• Natural Ecosystem</li> <li>• Artificial Ecosystem</li> <li>• Structure of Ecosystem</li> </ul> </li> </ul>	
<b>References:</b>		
<ol style="list-style-type: none"> <li>1. Kardong, K.V. (2005) <i>Vertebrates' Comparative Anatomy, Function and Evolution</i>. IV Edition. McGraw-Hill Higher Education.</li> <li>2. Kent, G.C. and Carr R.K. (2000). <i>Comparative Anatomy of the Vertebrates</i>. IX Edition. The McGraw-Hill Companies.</li> <li>3. Young, J. Z. (2004). <i>The Life of Vertebrates</i>. III Edition. Oxford University press.</li> <li>4. Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.</li> <li>5. Introduction to Chordates- T.C. Majumuria, Pradeep Publication, Jalandhar, India.</li> <li>6. Kardong, K.V. (2005) <i>Vertebrates' Comparative Anatomy, Function and Evolution</i>. IVth Edition. McGraw-Hill Higher Education.</li> <li>7. Kent, G.C. and Carr R.K. (2000). <i>Comparative Anatomy of the Vertebrates</i>. IX Edition. The McGraw-Hill Companies</li> <li>8. Young, J. Z. (2004). <i>The Life of Vertebrates</i>. III Edition. Oxford University press.</li> <li>9. Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.</li> </ol>		



13. Chordates and Invertebrates- Titles by N.Arumugam, Saras Publi., Kanyakumari, India.  
 14. Ecology and environment by P.D.Sharma.  
 15. General Animal Ecology by T.N. Ananthakrishnan  
 16. Ecology by N.S. Subrahmanyam  
 17. Fundamentals of Ecology by E.P.Odum

### Course Name: Chordates I and Ecology

COURSE CODE: ZOOMJ-S1P2-3CR25

#### Question paper Template

Unit	Remembering (1)	Understanding (2)	Applying (3)	Analyzing (4)	Evaluating (5)	Creating (6)	Total
I	45%	55%	-	-	-	-	100%
II	15%	55%	30%	-	-	-	100%
III	20%	50%	30%	-	-	-	100%

#### Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
• Know and explain general characteristics of vertebrate.	√	√				
• Identify the taxonomic status and evolutionary significance of entire chordates.		√				
• Impaired the knowledge on ecological adaptations.	√					
• Identify and explain scales of Pisces.	√	√				
• Identify venomous & non-venomous snakes.	√	√				
• Draw and know different types of beak and feet structure of birds.	√		√			
• Differentiate prototheria, metatheria & eutheria.	√		√			
• Understand basic of ecology	√					
• Explain and draw types of ecosystems	√		√			
• Describe importance of ecosystem		√				



**F.Y. B. Sc. (Zoology)**  
**SEMESTER – I**  
**MJ: Practical-I**  
**Course Name: Zoology Practical-I**  
**COURSE CODE: ZOOMJ-S1PR1-1CR25**  
**Practical Credit- 01**

**Course Learning Outcome**

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

- Identify various animals based on morphological features of non- chordate and chordate animas.
- Identify developmental stages of Liver fluke.

**Practical Module – I (ZOOMJ-S1PR1-1CR25)**

**[10L]**

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

1	Study of the following specimens: <ul style="list-style-type: none"><li>• Amoeba</li><li>• Euglena</li><li>• Paramecium</li><li>• Sycon</li><li>• Hyalonema</li></ul>
2	Study of the following specimens: <ul style="list-style-type: none"><li>• Physalia</li><li>• Jelly fish</li><li>• Sea anemone</li><li>• Tapeworm</li><li>• Ascaris; Male and Female</li></ul>
3	Study of the following specimens: <ul style="list-style-type: none"><li>• Nereis</li><li>• Pheretima</li><li>• Hirudinaria</li><li>• Crab</li><li>• Centipede</li><li>• King crab</li><li>• Silver fish</li><li>• Cockroach</li><li>• Butterfly</li></ul>
4	Study of the following specimens:



	<ul style="list-style-type: none"> <li>• Chiton</li> <li>• Dentalium</li> <li>• Pila</li> <li>• Ostrea</li> <li>• Octopus</li> <li>• Starfish</li> <li>• Brittle star</li> <li>• Sea urchin</li> <li>• Sea cucumber</li> <li>• Balanoglossus</li> </ul>	
5	Study of the following permanent slides: Liver fluke: Larva stages.miracidium, sporocyst, redia, cercaria	

**F.Y. B. Sc. (Zoology) SEMESTER – I**  
**MJ: Practical-II**  
**Course Name: Zoology Practical-II**  
**COURSE CODE: ZOOMJ-S1PR2-1CR25**  
**Practical Credit- 01**

<b>Course Learning Outcome</b>	
After the successful completion of the Course, the learner will be able to:	
<ul style="list-style-type: none"> <li>• Identify various animals based on morphological features of chordate animals.</li> <li>• Identify the taxonomic status and draw animals with specific features.</li> </ul>	
<b>Practical Module – II(ZOOMJ-S1PR2-1CR25)</b>	
<b>[10L]</b>	
The following practicals are to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models etc.	
<ul style="list-style-type: none"> <li>• Know and explain general characteristics of vertebrate.</li> <li>• Identify the taxonomic status and draw animals with specific features.</li> <li>• Identify and explain scales of Pisces.</li> <li>• Identify and will draw venomous &amp; non-venomous snakes.</li> <li>• Draw and know different types of beak and feet structure of birds.</li> <li>• Differentiate prototheria, metatheria &amp; eutheria with an example.</li> <li>• Explain and draw types of ecosystems</li> <li>• Describe importance of ecosystem</li> </ul>	
1	1. Study of the following specimens: <ul style="list-style-type: none"> <li>• Herdmania</li> </ul>



	<ul style="list-style-type: none"> <li>• Branchiostoma</li> <li>• Petromyzon,</li> <li>• Shark</li> <li>• Pristis</li> <li>• Torpedo (Electric Ray Fish)</li> <li>• Rohu</li> <li>• Flying Fish</li> <li>• Ichthyophis</li> <li>• Salamander</li> <li>• Bufo</li> <li>• Hyla</li> </ul>
2	<p>Study of the following specimens:</p> <ul style="list-style-type: none"> <li>• Chelone</li> <li>• Hemidactylus</li> <li>• Chamaeleon</li> <li>• Russel's Viper</li> <li>• Indian Cobra</li> <li>• Crocodylus</li> <li>• Gavialis (Gharial)</li> </ul>
3	<p>Study of the following specimens:</p> <ul style="list-style-type: none"> <li>• Pigeon</li> <li>• Peacock</li> <li>• Sparrow</li> <li>• Platypus</li> <li>• Kangaroo</li> <li>• Bat</li> <li>• Dolphin</li> </ul>
4	Amphibia: To study parental care in: Ichthyophis, Alytes (Midwife Toad), Hyla, Pipa Americana, <i>Rhinoderma darwinii</i> and Desmognathus
5	Reptiles: Identification of venomous and non-venomous snakes with key: Dhaman, Python, Russell's Viper, Krait, Cobra, Sea Snake
6	Aves: Modification Beak and Feet
7	Mammals: Duck bill platypus, Kangaroo, Dolphin
8.	Types of Ecosystems

**Mapping of CLOs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6



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Identify various animals based on morphological features of non-chordate and chordate animals.	√					
Identify developmental stages of Liver fluke	√					
Know and explain general characteristics of vertebrate.	√	√				
Understand and explain pathogenesis and parasitic adaptations of liver fluke.	√	√				
Systematic position and various systems in Liver fluke.		√				
Identify the taxonomic status and draw animals with specific features.			√			
Identify and explain scales of Pisces.		√				
Identify and will draw venomous & non-venomous snakes.		√	√			
Draw and know different types of beak and feet structure of birds.	√		√			
Differentiate prototheria, metatheria & eutheria with an example			√			
Explain and draw types of ecosystems		√	√			



**F.Y. B. Sc. (Zoology)**  
**SEMESTER I**  
**MN:CC I**  
**Course Name: Non Chordates & Chordates**  
**COURSE CODE: ZOOMN-S1P1-2CR25**  
**THEORY [CREDITS - 02]**

<b>Course learning outcome</b>		
<p>After successfully completing this course, students will be able to:</p> <ul style="list-style-type: none"> <li>• Know various disciplines of zoology.</li> <li>• Explain general characters of invertebrate phyla.</li> <li>• Identify difference animals of difference phylum.</li> <li>• Know and explain general characteristics of vertebrate.</li> <li>• Able to state the general characters, structural organisation and classification of chordate.</li> <li>• Identify and classify difference animals of vertebrate class.</li> <li>• Explain prototheria, metatheria &amp; eutheria.</li> </ul>		
<b>Module 1</b>	<b>Non Chordates</b>	<b>[10L]</b>
<b>Learning Objective</b>		
<ul style="list-style-type: none"> <li>• Taxonomy of non-chordate and chordate.</li> </ul>		
<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Explain general characters of invertebrate phyla.</li> <li>• Identify difference animals of difference phylum.</li> <li>• Describe general taxonomic scales on animal classification</li> <li>• Learn the concepts and approaches of taxonomy</li> <li>• Know and explain general characteristics of vertebrate.</li> <li>• Identify and classify difference animals of vertebrate class.</li> </ul>		
<b>1.1</b>	<b>Scope, Disciplines and Career in Zoology.</b>	<b>[4L]</b>
<b>1.2</b>	<b>General Characteristics of Non Chordate Phyla:</b> <ul style="list-style-type: none"> <li>• Protozoa</li> <li>• Porifera</li> <li>• Cnidaria</li> <li>• Platyhelminthes</li> <li>• Aschelminthes</li> <li>• Annelida</li> </ul>	<b>[6L]</b>
<b>Module 2</b>	<b>Chordates</b>	<b>[10L]</b>
<b>Learning Objective</b>		
Specification of each class from Pisces to mammal.		



**Learning Outcomes:**

- Able to state the general characters, structural organisation and classification of chordate.
- Identify and classify difference animals of vertebrate class.
- Explain prototheria, metatheria & eutheria.

2.1

**General Characteristics of Chordates:**

- Protochordates
- Pisces
- Amphibian
- Reptiles
- Aves
- Mammals

**References:**

1. JawaidAhsan, Sinha, S. P. 2008. A Handbook of Economic Zoology. S.Chand and Co. Publ. 272 pages.
2. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition.Holt Saunders International Edition.
3. Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*.IVthEdition.McGraw-Hill Higher Education.
4. Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition.The McGraw-Hill Companies.
5. 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.
6. Young, J. Z. (2004). *The Life of Vertebrates*.III Edition.Oxford Universitypress.
7. Modern Text Book of Zoology (vertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
8. Modern Text Book of Zoology (invertebrate) R.L. Kotpal, Rastogi Publication, Meerut, India.
9. Invertebrate Zoology- E.L. Jordan & P.S.Verma
10. Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar,India.
11. A Text Book of Histology – Leslie P. Gartner-4<sup>th</sup>edi. -Amazone.
12. Intruduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar,India.
13. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co.Ltd. New Delhi, India.
14. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co.Ltd. New Delhi, India.



**Course Name: Non Chordates & Chordates**  
**COURSE CODE: ZOOMN-S1P1-2CR25**  
**Question paper Template**

Unit	Remembering (1)	Understanding (2)	Applying (3)	Analyzing (4)	Evaluating (5)	Creating (6)	Total
I	45%	55%	-	-	-	-	100%
II	50%	50%	-	-	-	-	100%

**Mapping of CLOs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Know various disciplines of zoology.	√					
Explain general characters of invertebrate phyla.		√				
Identify difference animals of difference phylum.		√				
Know and explain general characteristics of vertebrate.	√	√				
Able to state the general characters, structural organisation and classification of chordate.	√					
Identify and classify difference animals of vertebrate class.	√	√				
Explain prototheria, metatheria & eutheria.		√				



**F.Y. B. Sc. (Zoology)**  
**SEMESTER I**  
**MN: Practical-I**  
**Course Name: Zoology Practical-I**  
**COURSE CODE: ZOOMN-S1PR1-2CR25**  
**Practical [CREDITS - 02]**

**Course Learning Outcome**

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

- Explain general characters of invertebrate phyla.
- Identify difference animals of difference phylum.
- Know and explain general characteristics of vertebrate.
- Identify and classify difference animals of vertebrate class.
- Explain prototheria, metatheria & eutheria.

**PRACTICAL Module (Based on ZOOMN-S1PR1-2CR25)**

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

1	Study of the following specimens: <ul style="list-style-type: none"><li>• Amoeba</li><li>• Euglena</li><li>• Sycon</li><li>• Hyalonema</li></ul>
2	Study of the following specimens: <ul style="list-style-type: none"><li>• Physalia</li><li>• Jelly fish</li><li>• Sea anemone</li><li>• Tapeworm</li><li>• Male and female Ascaris</li></ul>
3	Study of the following specimens: <ul style="list-style-type: none"><li>• Nereis</li><li>• Pheretima</li><li>• Hirudinaria</li></ul>
4	1. Study of the following specimens: <ul style="list-style-type: none"><li>• Herdmania</li><li>• Branchiostoma</li><li>• Petromyzon,</li><li>• Shark</li><li>• Torpedo (Electric Ray Fish)</li><li>• Rohu</li><li>• Ichthyophis</li><li>• Salamander</li><li>• Bufo</li></ul>
5	Study of the following specimens:



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	<ul style="list-style-type: none"> <li>• Chelone</li> <li>• Hemidactylus</li> <li>• Chamaeleon</li> <li>• Russel's Vipera</li> <li>• Crocodylus</li> </ul>	
6	Study of the following specimens: <ul style="list-style-type: none"> <li>• Peacock</li> <li>• Sparrow</li> <li>• Platypus</li> <li>• Kangaroo</li> <li>• Bat</li> </ul>	

**Mapping of COs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Explain general characters of invertebrate phyla.	√	√				
Identify difference animals of difference phylum.	√	√				
Know and explain general characteristics of vertebrate.		√				
Identify and classify difference animals of vertebrate class.		√				
Explain prototheria, metatheria & eutheria..		√				



**F.Y. B. Sc. (Zoology)**  
**SEMESTER – I**  
**MDC-I**  
**Course Name: Human Health and Diseases**  
**COURSE CODE: ZOOMDC-S1P1-4CR25**  
**THEORY [Credit -04]**

Course learning outcome		
After successfully completing this course, students will be able to:		
<ul style="list-style-type: none"> <li>• Define pathogens, parasites, vectors and parasitism.</li> <li>• Know different parasites, vectors and pathogens.</li> <li>• Differentiate diseases, disorders &amp; syndrome.</li> <li>• Explain causes, symptoms and prevention of some common diseases like Filariasis, Leptospirosis, Malaria, and Dengue.</li> <li>• Explain causes and symptoms Chromosomal syndrome and Hormonal syndrome.</li> <li>• Understand basic difference between Phobia and OCD</li> <li>• Understand Symptoms of Phobia and OCD.</li> </ul>		
<b>Module 1</b>	<b>Introduction</b>	<b>[07L]</b>
<b>Learning Objective</b>		
<ul style="list-style-type: none"> <li>• Important terms for diseases, Basic difference between certain terminologies like Parasitology, Parasite, Vector, etc.</li> </ul>		
<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Define pathogens, parasites, vectors and parasitism.</li> <li>• Know different parasites, vectors and pathogens.</li> <li>• Differentiate Diseases, Disorders and Syndrome.</li> </ul>		
1.1	Definition and introduction of Pathogens, Parasites, Vectors, Parasitism  Difference between Diseases, Disorders and Syndrome	<b>[7L]</b>
<b>Module 2</b>	<b>Causes, Symptoms and Prevention</b>	<b>[8L]</b>
<b>Learning Objective</b>		
Include awareness of South Gujarat diseases.		
<b>Learning Outcomes:</b>		
<ul style="list-style-type: none"> <li>• Explain causes, symptoms and prevention of some common diseases like Filariasis, Leptospirosis, Malaria, and Dengue.</li> </ul>		
2.1	<ul style="list-style-type: none"> <li>• Causes, Symptoms and Prevention of some common regional diseases of South Gujarat:</li> </ul>	8L



	<ul style="list-style-type: none"> <li>• Filariasis</li> <li>• Leptospirosis</li> <li>• Malaria</li> <li>• Dengue</li> </ul>	
<b>Module 3</b>	<b>Syndromes</b>	<b>[8L]</b>
<b>Learning Objectives:</b> This module is intended to <ul style="list-style-type: none"> <li>• Understand Syndrome (Genetic and Metabolic)</li> </ul>		
<b>Learning Outcome:</b> After the successful completion of the module, the learner will be able to <ul style="list-style-type: none"> <li>• Chromosomal Syndrome and Hormonal Syndrome.</li> </ul>		
3.1	Causes and symptoms of genetic syndromes <ul style="list-style-type: none"> <li>• Down syndrome</li> <li>• Patau syndrome</li> </ul>	5L
3.2	Causes and symptoms of metabolic syndromes <ul style="list-style-type: none"> <li>• Diabetes</li> </ul>	3L
<b>Module 4</b>	<b>Disorders</b>	<b>[7L]</b>
<b>Learning Objectives:</b> This module is intended to <ul style="list-style-type: none"> <li>• Show difference between Phobia and OCD</li> </ul>		
<b>Learning Outcome:</b> After the successful completion of the module, the learner will be able to <ul style="list-style-type: none"> <li>• Understand basic difference between Phobia and OCD</li> <li>• Symptoms of Phobia and OCD.</li> </ul>		
4.1	Cause and symptoms of anxiety disorders <ul style="list-style-type: none"> <li>• Introduction of Phobia</li> <li>• Aquaphobia</li> <li>• Acrophobia</li> <li>• Obsessive-Compulsive Disorder (OCD)</li> </ul>	7L
<b>References:</b> <ol style="list-style-type: none"> <li>1. Food hygiene &amp; sanitation- Roday.S ,tataMcGraw hill publishing company ltd.</li> <li>2. Food science- B.Srilakshmi.</li> <li>3. MohiniSethi, catering management, New age international publishers.</li> <li>4. Sri Lakshmi.B – Food science, New Age International Publishers.</li> <li>5. Park K (2011). Park’s Textbook of Preventive and Social Medicine, 21<sup>st</sup> EditionM/sBanarasidasBhanot Publishers, Jabalpur, India.</li> <li>6. <a href="https://my.clevelandclinic.org/health/diseases/21956-acrophobia-fear-of-heights">https://my.clevelandclinic.org/health/diseases/21956-acrophobia-fear-of-heights</a></li> <li>7. <a href="https://my.clevelandclinic.org/health/diseases/22958-aquaphobia-fear-of-water">https://my.clevelandclinic.org/health/diseases/22958-aquaphobia-fear-of-water</a></li> <li>8. <a href="https://my.clevelandclinic.org/health/diseases/9490-ocd-obsessive-compulsive-">https://my.clevelandclinic.org/health/diseases/9490-ocd-obsessive-compulsive-</a></li> </ol>		



[disorder](#)

**Course Name: Human Health and Diseases**  
**COURSE CODE: ZOOMDC-S1P1-4CR25**  
**Question paper Template**

Unit	Remembering (1)	Understanding (2)	Applying (3)	Analyzing (4)	Evaluating (5)	Creating (6)	Total
I	45%	55%	-	-	-	-	100%
II	45%	55%	-	-	-	-	100%
III	35%	65%	-	-	-	-	100%
IV	50%	50%	-	-	-	-	100%

**Mapping of CLOs and PSOs**

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Describe common diseases.		√				
Understand about causative agent of diseases	√					
Explain how to prevention diseases.		√				



**F.Y. B. Sc. (Zoology)**  
**SEMESTER I**  
**SEC-I**  
**Course Name: Aquarium Management**  
**COURSE CODE: ZOOSEC-S1P1-2CR25**  
**PRACTICAL [CREDITS - 02]**

**Course learning outcome**

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

- Demonstrate practical skills.
- How to prepare aquarium.
- Know and explain different types of aquaria.
- Understand preparation and management of aquarium.
- Explain different aquarium fishes.
- Identify aquarium fishes.

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

Module 1	Introduction of Aquarium	[07L]
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Learning Objective

Basics of Aquarium and construction of Aquarium.

Learning Outcomes:

- Know and explain different types of aquaria.
- Understand preparation and management of aquarium

1.1	<ul style="list-style-type: none"><li>• Types of aquaria</li><li>• Preparation of aquarium</li><li>• Management of aquarium</li></ul>	[7L]
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Module 2	Aquarium Fishes	[8L]
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Learning Objective

Ornamental Fish for Aquarium.

Learning Outcomes:

- Explain different aquarium fishes.



<ul style="list-style-type: none"> <li>Identify aquarium fishes.</li> </ul>		
2.1	To study some aquarium fishes characteristics with examples <ul style="list-style-type: none"> <li>Common Gold fish</li> <li>Lion fish</li> <li>Black molly</li> <li>Angel fish</li> <li>Sword tail fish</li> <li>Pearl Gourami</li> </ul>	[6L]
<b>References:</b> <ol style="list-style-type: none"> <li>An Introduction to fishes-S.S.Khanna.</li> <li>Fish and Fisheries of India-V.G.Jhingran.</li> <li>Fish and Fisheries –A.R.Shukla</li> <li>Fish and Fisheries-B.N.Yadav.</li> <li>Ichthyology-Lagler,Bardach,Passino &amp; Miller</li> <li>Fundamentals of Ichthyology-Gupta,Guhalwat,Yadav,Jain</li> <li>Fundamentals of Ichthyology-S.P.Biswas</li> <li>General and Applied Ichthyology-S.K.Gupta,P.C.Gupta.</li> <li>An Introduction to fishes-G.S.Sandhu.</li> <li>Fish Biology-C.B.L.Srivastava</li> <li>A Textbook of Fish Biology and Fisheries- S.S.Khanna and H.R.Singh</li> </ol>		

### Mapping of CLOs and PSOs

Course Learning Outcomes	Programme Outcomes					
	1	2	3	4	5	6
Demonstrate practical skills.			√			
Know and explain different types of aquaria.	√	√				
How to prepare aquarium.		√	√			
Understand preparation and management of aquarium.	√					
Explain different aquarium fishes.		√				
Identify aquarium fishes.		√				