

KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY,  
BHUJ.

Year: 2024-2025



B.Sc (Honours)

# ZOOLOGY

(With Research /Without Research)

Semesters : III and IV  
(Exit option)

FACULTY OF SCIENCE

## SYLLABUS

Curriculum as per UGC Guideline  
Framed according to National Education Policy (NEP) - 2020  
With effect from June – 2024 (and thereafter)



**B.Sc. (Honours) Zoology Programme**  
**(With Research/without Research)**

**NEP-2020**

**With effect from June – 2024 (and thereafter)**

**FACULTY OF SCIENCE**

**Subject: ZOOLOGY**

**B. Sc. Semesters: III & IV**

**NATURE AND EXTENT OF BACHELOR'S DEGREE PROGRAMME IN ZOOLOGY (HONOURS)**

A bachelor's degree in Zoology with Research or without Research is a 4 year degree course which is divided into 8 semesters.

Sl.No.	Type of Award	Stage of Exit	Mandatory Credits to be secured for the Award
1	Certificate in the Discipline	After successful completion of 1st Year	44 + 4
2	Diploma in the Discipline	After successful completion of 1st and 2nd Years	88 + 4
3	B.Sc. in Zoology	After successful completion of 1st, 2nd and 3rd Years	132
4	B.Sc. (Honours with Research/without Research) in Zoology	After successful completion of 1st, 2nd, 3rd and 4th Years	176

A student pursuing 4 years undergraduate programme with research in a specific discipline shall be awarded an appropriate Degree in that discipline on completion of 8th Semester if he/she secures required Credits. Similarly, for certificate, diploma and degree, a student needs to fulfill the associated credits. An illustration of credits requirements in relation to the type of award is illustrated as above.

Bachelor's Degree (Honours) is a well-recognized, structured, and specialized graduate level qualification in tertiary, collegiate education. The contents of this degree are determined in terms of knowledge, understanding, qualification, skills, and values that a student intends to acquire to look for professional avenues or move to higher education at the postgraduate level.

Thus, B.Sc. (Honours) Course in Zoology aims to prepare students to qualify for joining a profession or to provide development opportunities in particular employment settings.



**AIMS:**

1. To develop the curriculum for fostering subjective-learning.
2. To mould a responsible citizen who is aware of most basic domain-independent knowledge, including critical thinking and communication.
3. To offer an environment that guarantees intellectual development of students in an all-inclusive manner.
4. To provide updated subject matter theoretically and practically which can enhance student's core competency and learning.
5. To enable the graduate, prepare for national as well as international competitive examinations, especially UGC-CSIR NET and UPSC Civil Services Examination.

**Programme outcomes (POs):**

Transformed curriculum shall develop educated outcome-oriented candidature, to develop into responsible citizen for nation-building and transforming the country towards the future with their knowledge gained in the field of animal science.

**Programme specific objectives (PSOs): B.Sc. III & IV Year Certificate Course in Zoology**

- ✓ This course will enable students to learn avenues in Zoology.
- ✓ The first-year syllabus can help students to get ready for competitive exams.
- ✓ Students will be able to know about basic animal classification and cell structure.
- ✓ Certificate and diploma courses are framed to generate self- entrepreneurship and self- employability, if multi exit option is opted.
- ✓ Students will increase the ability of critical thinking, reasoning and curiosity, development of scientific attitude, problem solving, improve practical skills, enhance communication skill, social interaction, and increase awareness in animal conservation and environment.
- ✓ The training provided to the students will make them competent enough for doing jobs in Govt. and private sectors of academia, research and industry at entry level.
- The End of Semester Examination will be conducted by the University. A certified journal of the respective practical course must be produced at the time of practical examination by the student. The Field Excursion is highly essential for studying ecology and animals. There shall be at least one field Excursion (local or outstation).
- It is compulsory to record laboratory work in the Journal. Certified journal has to be produced while appearing at the time of Practical examination

**2<sup>ND</sup> year structure (Zoology)**

Year	Semester	Course Code	Paper Title	Credits	Marks		Total
					CA	UA	
Second Year	Sem-III	MJ ZOO-301 (Theory)	Animal Diversity (CHORDATA)	3	35	40	75
		MJ ZOO-302- P (Practical)	Animal Diversity (CHORDATA) (Practical)	1	15	10	25
		MJ ZOO-303 (Theory)	Cytology, Histology, Wildlife Biology and Environmental Issues	3	35	40	75



		MJ ZOO- 304- P (Practical)	Cytology, Histology, Wildlife Biology and Environmental Issues (Practical)	1	15	10	25
		MJ ZOO-305 (Theory)	Parasitology, Genetics and Biostatistics	3	35	40	75
		MJ ZOO-306- P (Practical)	Parasitology, Genetics and Biostatistics (Practical)	1	15	10	25
		MD ZOO- 307 (Theory)	Animal Diversity (CHORDATA)	3	35	40	75
		MD ZOO- 308- P (Practical)	Animal Diversity (CHORDATA) (Practical)	1	15	10	25
		<b>Total</b>		<b>16</b>	<b>Total Marks</b>		<b>400</b>
	<b>Credits</b>						
	<b>Sem - IV</b>	MJ ZOO-401 (Theory)	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	3	35	40	75
		MJ ZOO-402 - P (Practical)	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY (Practical)	1	15	10	25
		MJ ZOO-403 (Theory)	GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY	3	35	40	75
		MJ ZOO-404 - P (Practical)	GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY (Practical)	1	15	10	25
		MJ ZOO-405 (Theory)	ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY	3	35	40	75
		MJ ZOO-406- P (Practical)	ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY (Practical)	1	15	10	25
		MN ZOO 407 (Theory)	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	3	35	40	75
		MNZOO 408- P (Practical)	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY (Practical)	1	15	10	25
		<b>Total</b>		<b>16</b>	<b>Total Marks</b>		<b>400</b>
	<b>Credits</b>						



**Structure of the Question Paper for the University Exam**

**KSKV Kachchh University: BHUJ**  
SECOND YEAR B.Sc.: Semester: III & IV (ONE)

For Major and MDS Theory papers  
(ZOL 301, 303, 305, 307 & 401, 403, 405, 407)

**Total Marks: 40. Duration: \_\_\_\_\_**

**PATTERN OF QUESTION PAPER**

**FOR SEMESTER-END EXAMS (Sem III & IV)**

Questions	Section	Marks
Q.1	Descriptive / Essay type / Short notes (with internal options)	10 marks
Q.2	Descriptive / Essay type / Short notes (with internal options)	10 marks
Q.3	Descriptive / Essay type / Short notes (with internal options)	10 marks
Q.4	12 short questions of 01 marks each from all four units and the students have to attempt any 10	10 Marks

- The examination pattern of the university is 50% external and 50% internal.
- Types of questions for section A and Question 5 may be varied like: one-line answers / two-line answers / definitions / reasoning / drawing small figures/ label the figure / fill in the blanks / multiple choice question/ one word answer / match the pairs etc.
- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students.






**DETAILED SYLLABUS OF B.Sc. I YEAR FOR CERTIFICATE COURSE IN BASIC ZOOLOGY**

**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER -III**

**MJ ZOO-301: ANIMAL DIVERSITY AND CYTOGENETICS -I**  
(Course code: CEZO 301) Credit: 3

	<b>KSKV Kachchh University Bhuj - 370001</b>	<b>ACADEMIC YEAR 2024-25</b>		
<b>Bachelor of Science: Regular Major</b>				
<b>Year</b>	<b>II</b>	<b>MJ ZOO-301: ANIMAL DIVERSITY (CHORDATA)</b>	<b>Credit</b>	<b>3</b>
<b>Semester</b>	<b>III</b>		<b>Hours</b>	<b>2</b>
<b>OBJECTIVES:</b>	The course aims to 1) Develop an understanding of branches of Zoology and systematic 2). taxonomy of non-chordates from Protist to Annelida; 2) Study the body organization of each phylum; 3) Study the general biology of selected species from each Phylum.			
<b>COURSE CONTENT / SYLLABUS</b>				
<b>UNIT-I</b>	Study of following chordate groups along with their salient features, classification. <b>Classification upto Order/family with suitable examples;</b> i. Class-Reptilia: Characters and classification <ul style="list-style-type: none"> <li>• Venomous snakes of India &amp; general account</li> <li>• Biting mechanism of Snake</li> </ul> ii. Aves : Characters and classification <ul style="list-style-type: none"> <li>i. Birds as a successful flying machine – flight adaptations (morphological and physiological).</li> </ul> ((General Classification as per Whittaker’s Five Kingdom Classification and Phylum Classification as per adapted in vertebrate Series by R. L. Kotpal, Rastogi Publication Meerut))			<b>1</b>
<b>UNIT-II</b>	<b><u>TYPE STUDY – CHORDATA – Calotes (Calotes Versicolor)</u></b> <b><u>(THROUGH CHARTS/ MODELS/ MULTIMEDIA)</u></b> i. Classification ii. Habit & Habitat iii. External characters iv. Digestive System v. Circulatory System vi. Urinogenital system			<b>1</b>



UNIT-III	<b>TYPE STUDY – CHORDATA - Pigeon (<i>Columba livia</i>) (THROUGH CHARTS/ MODELS/ MULTIMEDIA) [15]</b> <ol style="list-style-type: none"> <li>i. Classification</li> <li>ii. Habit &amp; Habitat</li> <li>iii. External characters</li> <li>iv. Digestive System</li> <li>v. Respiratory System &amp; Air Sacs</li> <li>vi. Brain</li> <li>vii. Reproductive System</li> </ol>	1
<b>REFERENCES</b>		
1.	A Manual of Zoology Vol. III & IV, Ekambarnath Ayyar and Ananthakrishnan, Viswanthan Pvt. Ltd. Madras.	
2.	Biology of Animals, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.	
3.	Modern Text Book of Zoology: vertebrates By R.L. Kotpal	
4.	Integrated principals of Zoology, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.	

Note: Students may refer variety of material available online and on web resources for further understanding.



**SEMESTER 3:**  
**Paper MJ ZOO- 302-P: ANIMAL DIVERSITY (CHORDATA)**

**Practical/ Lab course (Credit- 1)**

**Course Outcome**

After the completion of the course the students will be able to:

1. Understand and identify taught practical invertebrate animals to class level.
2. Develop skills for studying the animal characters and observational skills
3. Learn observational skills and demonstrate the same in journals and exams. The virtual look at different animal groups will help them to inculcate curiosity in their minds.

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -III	MJ ZOO-302 P	ANIMAL DIVERSITY (CHORDATA)	1	30 hrs	25 (15+10) Marks

Practical 1: Classification of Reptiles: Calotis, house lizard, gecko, Cobra, rat snake, Saw scaled viper, Chameleon, Crocodile, Tortoise, Turtle, Varanus, Mabuya, spiny tailed lizard

Practical 2: Classification of Aves: Pigeon, Sparrow, Kite, Vulture, Hoopoe, Green bee eater, Goose, Partridge, Crane, Kingfisher, Parakeet, Owl, Crow, Lapwing, Swift.

Practical 3: Study of external characters of Calotis

Practical 4: Study of Digestive system of Calotis

Practical 5: Study of Circulatory system of Calotis

Practical 6: Study of Urogenital system of Calotis

Practical 6: Mounting (Pectin and Hyoid apparatus)

Practical 7: To study external characters of Pigeon (Through chart/multimedia)

Practical 8: Study of Digestive system of Pigeon (Through chart/multimedia)

Practical 9: Study of Respiratory system of Pigeon (Through chart/multimedia)

Practical 10: Study of Brain of Pigeon (Through chart/multimedia)

Practical 11: To study Reproductive system of Pigeon (Through chart/multimedia)

**Journal / Submission**

- Note: It is compulsory to record laboratory work (all the practicals) in the journal. The journal is to be certified by the in-charge teacher and the Head of the Department within time frame. Certified journal must be produced while appearing at the time of Practical examination.

- The field observations should be recorded in the journal.





**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-III: MJZOO-302-P: ANIMAL DIVERSITY (CHORDATA)**

**INTERNAL EVALUATION: 15 Marks**  
**EXTERNAL EVALUATION: 10 Marks**

**B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MAJ ZOL-302 P**  
(Structure will remain same for paper 302, & 308)


**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Draw/Demonstrate & explain the _____ system of Calotis.	02
Exercise 2. Draw/Demonstrate & explain the _____ system of Pigeon.	02
Exercise 3. Identify and describe as per given instructions (1 marks each)	04
1. Identify and classify giving reasons - Phylum	
2. Identify and classify giving reason - Phylum	
3. Identify and describe – Phylum	
4. Identify and do as direct - Mounting	
Exercise 4. a. <i>Viva-voce</i>	01
b. Journal	01
<b>TOTAL</b>	<b>10</b>

**Note: Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical**

- *Certified journal will be compulsory for appearing in Univ. Practical exam*
- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students. Field learning included.



		<b>KSKV Kachchh University</b> Bhuj - 370001		<b>ACADEMIC YEAR 2024-25</b>	
<b>Bachelor of Science: Regular Major (Core)</b>					
Year	II	<b>MJ ZOO- 303: Wildlife Biology And Environmental Issues</b>		Credit	3
Semester	III			Hours	2
<b>OBJECTIVES (CO's):</b>		The course aims to 1) Increase sensitization towards environment conservation and efforts; 2) Understanding Indian wildlife; 3) Sensitization to environment issues.			
<b>COURSE CONTENT / SYLLABUS</b>					
<b>UNIT-I</b>	<b>International Treaties and conventions</b> <i>i. CITES</i> <i>ii. Ramsar Convention</i> <i>iii. Bonn Convention</i> <i>iv. UNCCD (UN Convention to Combat Desertification)</i> <i>v. Convention on Biological Diversity (CBD), Rio Earth Summit</i> <i>vi. United Nations Framework Convention on Climate Change (UNFCCC)</i>				1 Credit
<b>UNIT-II</b>	<b>1. National Park and Sanctuaries</b> Example studies: Gir National Park, Marine National Park, Velavadar National Park, Jim Corbett National Park, Wild Ass Sanctuary. <b>2. Tools for Wildlife study:</b> Binoculars, Cameras, Radio transmitters/ receivers, Tranquilizers (guns and darts), Camera traps. <b>3. Wildlife Conservation:</b> - Indian Wildlife Act - IUCN Red list categories - Endangered Fauna (With Scientific name and status): Asiatic lion, Indian Wild ass, Tiger, Leopard, Great Indian Bustard, One horned Rhino, Gangetic dolphin, Vultures.				1 Credit



<b>UNIT-III</b>	<b>Current Environmental Issues</b> 1. Deforestation, Habitat destruction, Over exploitation of resources. 2. Global Warming and Green House effect: Causative gases, Climate change, possible effects, Sea level change, Ozone depletion 3. Plastic pollution: Effect of plastic on ecosystem, effect on animals. Best practices. 4. Rain Water Harvesting (Importance of RWH, various methods of RWH)	1 Credit
<b>REFERENCES</b>		
1.	Threatened animals of India, B. K. Tikader, ZSI, Calcutta	
2.	T. C. Cell Biology, Genetics, Evolution and Ecology	
3.	Wildlife of India, Mark E. Trisch, HarperCollins Pub.	
4.	Inderbir singh's textbook of human histology with colour atlas and practical guide. jaypee brothers medical publishers.	
5.	Cell And Molecular Biology by De Robertis	



**SEMESTER - III**  
**MJ ZOO 304-P: Wildlife Biology and Environmental Issues**

**Practical/ Lab course (Course code: MAJ ZOO 304 P) Credit: 1**

**Course Outcome**

After the completion of the course the students will be able to:

1. Understand and identify taught practical invertebrate animals to class level.
2. Learn observational skills and demonstrate the same in journals and exams. The virtual look at different animal groups will help them to inculcate curiosity in their minds.

<b>DISCIPLINE SPECIFIC CORE COURSE</b>						
<b>COURSE</b>	<b>SEMESTER</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>PRACTICAL</b>		
				<b>Credits</b>	<b>Lectures</b>	<b>Total (Internal + External)</b>
<b>Certificate Course</b>	<b>B.SC - III</b>	<b>MJ ZOO 304-P</b>	<b>Wildlife Biology and Environmental Issues</b>	<b>1</b>	<b>30 hrs</b>	<b>25 (15+10) Marks</b>

Practical 1: Plotting of important national Parks and Sanctuaries on map.

Practical 2: Study of wildlife tools: Binoculars, Tranquilizers (Guns and darts), Radio transmitters and receivers.

Practical 3: Study of collection and identification of common animal's pugmarks.

Practical 4: Study of selected important animals (using IUCN or wildlife act categories) of India (Asiatic Lion, Bengal Tiger, Leopard, Asiatic Elephant, Gangetic Dolphin, Snow Leopard, White rumped Vulture, One horned Rhino, Lion tailed macaque, Kashmiri Red stag, Nilgiri Thar) Extra can be added.

Practical 5: Study of selected important animals of Gujarat (using IUCN or wildlife act categories) (Asiatic lion, Blackbuck, Spiny tailed lizard, Indian caracal, Asiatic wild ass, Indian Wolf, Great Indian Bustard, Black francolin, Blue whale) more can be added.

Practical 6: Plotting distribution of animals on map (animals as per Prac.-4)

Practical 7: Study of Rain Water Harvesting system (Through chart/multimedia)

Practical 8: Preparing a case study/Field project/ Report based on environmental issue

Practical 9: Field work/activity

**Journal / Submission**

- Note: It is compulsory to record laboratory work (all the practical) in the journal. The journal is to be certified by the in-charge teacher and the Head of the Department within time frame. Certified journal must be produced while appearing at the time of Practical examination.

- Field work allied activity to be submitted in journal or as report



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-III: MJ ZOO304-P: Wildlife Biology and Environmental Issues**

**INTERNAL EVALUATION: 15 Marks**

**EXTERNAL EVALUATION: 10 Marks**

**Total Marks: 20 (10)**


<b>Instructions: Strictly follow the instructions given by examiner(s).</b>		<b>Marks</b>
Exercise 1: Animal Distribution on map.		02
Exercise 2. Plotting NP & Sanctuaries on map		02
Exercise 3. Identify and describe as per given instructions (1marks each)		04
1. Identify and describe (animal)		
2. Identify and describe		
3. Identify and describe		
4. Identify and describe		
Exercise 4. a. Journal & Filed report		02
<b>TOTAL</b>		<b>10</b>

***Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical***

**Note:**

- *Certified journal will be compulsory for appearing in Univ. Practical exam*
- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students.



		<b>KSKV Kachchh University</b> Bhuj - 370001		<b>ACADEMIC YEAR</b> 2024-25	
<b>Bachelor of Science:</b> (MAJOR)					
Year	II	<b>MJ ZOO-305: Parasitology, Genetics and Biostatistics</b>		Credit	3
Semester	III			Hours	2
<b>OBJECTIVES:</b>		The course aims to 1) Develop an understanding of branches of Zoology and systematic 2). taxonomy of non-chordates from Protist to Annelida; 2) Study the body organization of each phylum; 3) Study the general biology of selected species from each Phylum.			
<b>COURSE CONTENT / SYLLABUS</b>					
<b>UNIT-I</b>	<b>HUMAN PARASITOLOGY</b> 1. Basic Terminologies: Parasite, Host and Parasitology (Only for short questions) 2. Types of Parasites: Facultative, Obligate, Endoparasites and Ectoparasites 3. Types of Hosts: Principal, Intermediate and Reservoir 4. Study of life cycle and pathogenicity for following human parasites; i. <i>Plasmodium vivax</i> ii. <i>Faciola hepatica</i> (Liver fluke)				<b>1</b>
<b>UNIT-II</b>	<b>GENETICS</b> 1. Sex linked inheritance i. Eye colour in drosophila ii. Colorblindness in humans iii. Hemophilia in humans 2. Crossing over: Mechanism of crossing over 3. Linkage: Linkage in drosophila				<b>1</b>
<b>UNIT-III</b>	<b>BASIC BIOSTATISTICS</b> 1. Importance of Biostatistics in biological studies 2. Mean, Median, Mode, Range 3. Standard deviation 4. Kurtosis, Skewness 5. Statistics tools: MS Excel, Preparation of various graphs (Bar, Pie chart, Scatter plot) 6. Primary & Secondary data collection 7. Mode of Secondary data collection				<b>1</b>
<b>REFERENCES</b>					
<b>1.</b>	Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut				





2.	Genetics by P. K. Gupta
3.	Genetics by V. B. Rastogi
4.	Methods in Biostatistics by B K Mahajan
5.	Textbook of Human Parasitology: Protozoology and Helminthology Ramnik Sood, 2019
6	Ecology, Env., Env. And Genetics by S. Chand

Note: Students may refer variety of material available online and on web resources for further understanding.



SEMESTER 3: MAJOR

MJ ZOO 306-P: Parasitology, Genetics and Biostatistics

Practical/ Lab course (Credit- 1)

**Course Outcome**

After the completion of the course the students will be able to:

1. Understand and identify taught practical invertebrate animals to class level.
2. Develop skills for studying the animal characters and observational skills
3. Learn observational skills and demonstrate the same in journals and exams. The virtual look at different animal groups will help them to inculcate curiosity in their minds.

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -III	MJ ZOO-306 P	Parasitology, Genetics and Biostatistics	1	30 hrs	25 (15+10) Marks

Practical 1: Study of human parasites: *Plasmodium vivax*, Liver fluke, Anopheles and culex mosquitoes, tape worm, mites, hair louse.

(Short description, type of parasite/host and its parasitic effects for each)

Practical 2: To study the lifecycle of *Plasmodium vivax* (Through chart/multimedia)

Practical 3: To study the lifecycle of *Fasciola hepatica* (Liver fluke)

(Through chart/multimedia)

Practical 4: To solve the problems of sex-linked inheritance Eye color in drosophila

Practical 5: To solve the problems of sex-linked inheritance Colorblindness in Human

Practical 6: To solve the problems of sex-linked inheritance Hemophilia in Human

Practical 7: To study Mechanism of crossing over (Through chart/multimedia)

Practical 8: To study Linkage in drosophila (Through chart/multimedia)

Practical 9: To calculate Mean, Median, Mode of given data

Practical 10: Preparation of various graphs using MS Excel & plotting in journal

Practical 11: Designing a questionnaire for secondary data.

**Journal / Submission**

- Note: It is compulsory to record laboratory work (all the practicals) in the journal. The journal is to be certified by the in-charge teacher and the Head of the Department within time frame. Certified journal must be produced while appearing at the time of Practical examination.

- The field observations should be recorded in the journal.



KSKV Kachchh University, Bhuj - Kachchh  
(Effective from June 2024-25 UNDER NEP-2020)

SEMESTER-III: (MAJOR)

MJ ZOO306-P: Parasitology, Genetics and Biostatistics

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 10 Marks

**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Draw/Demonstrate & explain the lifecycle of _____.	02
Exercise 2. Do as directed: Genetics problem as asked	02
Exercise 3. Identify and describe as per given instructions (1 marks each)	03
1. Identify and describe	
2. Identify and describe	
3. Identify and describe	
Exercise 4. a. <i>Biostatistics</i>	02
b. Journal	01
<b>TOTAL</b>	<b>10</b>


**Note:**

*Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical*

- *Certified journal will be compulsory for appearing in Univ. Practical exam*



**SEM-III MULTI DISCIPLINARY COURSE (MDC) ZOOLOGY**

	<b>KSKV Kachchh University Bhuj - 370001</b>		<b>ACADEMIC YEAR 2024-25</b>	
<b>Bachelor of Science: Multidisciplinary (MDC)</b>				
<b>Year</b>	<b>II</b>	<b>MD ZOL-307: ANIMAL DIVERSITY (CHORDATA)</b>	<b>Credit</b>	<b>3</b>
<b>Semester</b>	<b>III</b>		<b>Hours</b>	<b>2</b>
<b>OBJECTIVES:</b>	The course aims to 1) Develop an understanding of branches of Zoology and systematic 2). taxonomy of non-chordates from Protist to Annelida; 2) Study the body organization of each phylum; 3) Study the general biology of selected species from each Phylum.			
<b>COURSE CONTENT / SYLLABUS</b>				
<b>UNIT-I</b>	Study of following chordate groups along with their salient features, classification. <b>Classification upto Order/family with suitable examples;</b> ii. Class-Reptilia: Characters and classification <ul style="list-style-type: none"> <li>• Venomous snakes of India &amp; general account</li> <li>• Biting mechanism of Snake</li> </ul> ii. Aves : Characters and classification <ul style="list-style-type: none"> <li>ii. Birds as a successful flying machine – flight adaptations (morphological and physiological).</li> </ul> ((General Classification as per Whittaker's Five Kingdom Classification and Phylum Classification as per adapted in vertebrate Series by R. L. Kotpal, Rastogi Publication Meerut))			<b>1</b>
<b>UNIT-II</b>	<b>TYPE STUDY – CHORDATA – Calotes (<i>Calotes Versicolor</i>) (THROUGH CHARTS/ MODELS/ MULTIMEDIA)</b> i. Classification ii. Habit & Habitat iii. External characters iv. Digestive System v. Circulatory System vi. Urinogenital system			<b>1</b>



<b>UNIT-III</b>	<b>TYPE STUDY – CHORDATA - Pigeon (<i>Columba livia</i>) (THROUGH CHARTS/ MODELS/ MULTIMEDIA) [15]</b> <ol style="list-style-type: none"> <li>i. Classification</li> <li>ii. Habit &amp; Habitat</li> <li>iii. External characters</li> <li>iv. Digestive System</li> <li>v. Respiratory System &amp; Air Sacs</li> <li>vi. Brain</li> <li>vii. Reproductive System</li> </ol>	<b>1</b>
<b>REFERENCES</b>		
1.	A Manual of Zoology Vol. III & IV, Ekambarnath Ayyar and Ananthakrishnan, Viswanthan Pvt. Ltd. Madras.	
2.	Biology of Animals, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.	
3.	Modern Text Book of Zoology: vertebrates By R.L. Kotpal	
4.	Integrated principals of Zoology, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.	

Note: Students may refer variety of material available online and on web resources for further understanding.



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER 3:**  
**Paper MD ZOO-308-P: ANIMAL DIVERSITY (CHORDATA)**

**Practical/ Lab course (Credit- 1)**

**Course Outcome**

After the completion of the course the students will be able to:

1. Understand and identify taught practical invertebrate animals to class level.
2. Develop skills for studying the animal characters and observational skills
3. Learn observational skills and demonstrate the same in journals and exams. The virtual look at different animal groups will help them to inculcate curiosity in their minds.

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -III	MD ZOO-308 P	ANIMAL DIVERSITY (CHORDATA)	1	30 hrs	25 (15+10) Marks

Practical 1: Classification of Reptiles: Calotis, house lizard, gecko, Cobra, rat snake, Saw scaled viper, Chameleon, Crocodile, Tortoise, Turtle, Varanus, Mabuya, spiny tailed lizard

Practical 2: Classification of Aves: Pigeon, Sparrow, Kite, Vulture, Hoopoe, Green bee eater, Goose, Partridge, Crane, Kingfisher, Parakeet, Owl, Crow, Lapwing, Swift.

Practical 3: Study of external characters of Calotis

Practical 4: Study of Digestive system of Calotis

Practical 5: Study of Circulatory system of Calotis

Practical 6: Study of Urogenital system of Calotis

Practical 6: Mounting (Pectin and Hyoid apparatus)

Practical 7: To study external characters of Pigeon (Through chart/multimedia)

Practical 8: Study of Digestive system of Pigeon (Through chart/multimedia)

Practical 9: Study of Respiratory system of Pigeon (Through chart/multimedia)

Practical 10: Study of Brain of Pigeon (Through chart/multimedia)

Practical 11: To study Reproductive system of Pigeon (Through chart/multimedia)

**Journal / Submission**

- Note: It is compulsory to record laboratory work (all the practicals) in the journal. The journal is to be certified by the in-charge teacher and the Head of the Department within time frame. Certified journal must be produced while appearing at the time of Practical examination.

- The field observations should be recorded in the journal.





**KSKV Kachchh University, Bhuj - Kachchh**  
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**SEMESTER-III: MD ZOO-308-P: ANIMAL DIVERSITY (CHORDATA)**

**INTERNAL EVALUATION: 15 Marks**  
**EXTERNAL EVALUATION: 10 Marks**

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MD ZOO308-P  
(Structure will remain same for paper 302, & 308)

**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).		Marks
Exercise 1: Draw/Demonstrate & explain the _____ system of Calotis.		02
Exercise 2. Draw/Demonstrate & explain the _____ system of Pigeon.		02
Exercise 3. Identify and describe as per given instructions (1 marks each)		04
5. Identify and classify giving reasons - Phylum		
6. Identify and classify giving reason - Phylum		
7. Identify and describe – Phylum		
8. Identify and do as direct - Mounting		
Exercise 4. a. <i>Viva-voce</i>		01
b. Journal		01
<b>TOTAL</b>		<b>10</b>

**Note: Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical**

- *Certified journal will be compulsory for appearing in Univ. Practical exam*
- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students. Field learning included.



**SYLLABUS OF B.Sc. 2<sup>nd</sup> YEAR ZOOLOGY**

**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-IV (Zoology Major)**

**Paper MJ ZOL 401: ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY**

THEORY (Credit 3)							
<b>Course Outcome (Objectives)</b>							
After the completion of the course the students will be able to: Develop understanding about the classification and diversity of different invertebrate phylum and classification system. Learn basic principles of ecology. Develop skills of presentations and narration using computer & multimedia.							
<b>DISCIPLINE SPECIFIC CORE COURSES (MAJOR)</b>							
	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	Internal	External
	B.Sc. IV	MJ ZOO-401	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	3	45	35 Marks	40 Marks
UNIT	TOPIC						No. Of Credits/Lectures (45hrs)
UNIT-1	<b>ADAPTATIONS</b> Introduction to adaptation. Details of following adaptations with suitable examples 1. Arboreal Adaptation 2. Aquatic adaptation 3. Cursorial adaptation 4. Fossorial adaptation						1 credit
UNIT 2	<b>ANIMAL BEHAVIOR</b> 1. Parental care – in general - Case studies Pisces, amphibians, and mammals 2. Adaptation of feet in Birds 3. Adaptation of beak in birds 4. Variation and Mimicry 5. Darwin theory of Natural selection						1 credit



<b>Unit 3</b>	<b>ZOOGEOGRAPHY</b> 1. Introduction 2. Brief account of Zoogeographical realms with mammalian fauna a. Australian Region b. Oriental Region c. Neotropical Region d. Ethiopian Region e. Nearctic Region f. Palaearctic Region 3. Biogeographic Zones of India	1 credit
<b>Suggested readings</b>		
1	Biology of the Invertebrates, J. A. Pechenik, Tata-McGraw Hill Company, Ltd, New Delhi.	
2	Modern Text book of Vertebrates by R. L. Kotpal • Genetics by P. K. Gupta • A Manual of Zoology Vol. I & II by Ekambernath Ayar	
3	Modern Text Book Of Zoology: Invertebrates By R.L. Kotpal	
4	Modern Text Book of Zoology: Vertebrates By R. R. Kotpal	
5	Animal Behavior by V. K. Agrawal. S. Chand Publishing.	
6	Concepts of Zoogeography and Wildlife by Dr. Umesh Bharti and Dr. Ravneet Kaur. Integrated publications	
7	Animal behavior by V. K. Agrawal	
8	Animal behavior by Reena Mathur	
Note: Students may refer variety of material available online and on web resources for further understanding.		



**KSKV Kachchh University, Bhuj - Kachchh**  
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**SEMESTER II:**

**Paper MJ ZOO 402-P: ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY**

<b>PRACTICAL (Credit- 1)</b>						
<b>Course Outcome</b>						
After the completion of the course the students will be able to: Develop skills for studying the animal characters, observational skills and field learning. They will learn preparing small reports and field observations at first year basic level.						
<b>DISCIPLINE SPECIFIC CORE COURSE</b>						
	<i>SEMESTER</i>	<i>COURSE CODE</i>	<i>COURSE TITLE</i>	<i>PRACTICAL</i>		
				<i>Credits</i>	<i>Lectures</i>	<i>INTERNAL/ External</i>
<i>Practical</i>	B.Sc - IV	MJ ZOO 402- P	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	1	30 hrs	25 (15+10) Marks

The basic aim to introduce the animal diversity and identification skill of student.

Practical 1: Study of Arboreal adaptations with suitable examples

Practical 2: Study of Aquatic adaptations with suitable examples

Practical 3: Study of Cursorial adaptations with suitable examples

Practical 4: Study of Fossorial adaptations with suitable examples

Practical 5: Study Parental care in different animals with suitable examples

Practical 6: Study of various types of feets in birds

Practical 7: Study of various types of beaks in birds

Practical 8: Marking various zoogeographic zones on the map. (Using world map)

Practical 9: Zoogeographic distribution of mammalian fauna on map. (Using world map) (Study of ecosystems will be using chart/multimedia and /or field visits)

**Note:** Documentation of practical and field reports in journals is must.



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-IV: MJ ZOO 402-P: ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY**

INTERNAL EVALUATION: 15 Marks  
EXTERNAL EVALUATION: 10 Marks

**B. Sc.: SKELETAL STRUCTURE OF EXTERNAL PRACTICAL**  
(MJZOO-402 P & MN ZO 408-P)

**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Mark the given Zoogeographic zones and animal distribution on the given world map.	02
Exercise 2: Mark the Zoogeographic/Indian geographic zones on given world map.	02
Exercise 3: Do as directed (1 marks each)	04
1. Identify animal and write about its adaptation 2. Identify animal and write about its parental care 3. Do as directed - type of feet 4. Do as directed – type of beak	
Exercise 4. a. Field Report/Viva	01
b. Journal	01
<b>TOTAL</b>	<b>10</b>

**Note: Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical**

*g. Certified journal will be compulsory for appearing in Univ. Practical exam*

- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students and counted in question-4.



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-IV (Zoology Major)**  
**Paper MJ ZOO 403: GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY**

<b>THEORY (Credit 3)</b>							
<b>Course Outcome (Objectives)</b>							
After the completion of the course the students will be able to: Develop understanding about the classification and diversity of different invertebrate phylum and classification system. Learn basic principles of ecology. Develop skills of presentations and narration using computer & multimedia.							
<b>DISCIPLINE SPECIFIC CORE COURSES (MAJOR)</b>							
	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	Internal	External
	B.Sc. IV	MJ ZOO 403	GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY	3	45	35 Marks	40 Marks
UNIT	TOPIC						No.Of Credits/Lectures (45hrs)
<b>UNIT-1</b>	<b>ANIMAL DIVERSITY (CHORDATA)</b> 1. Cephalochordate: Type: - Amphioxus i. Salient features of Cephalochordate ii. Systemic position iii. External character 2. Urochordata: i. Salient features of Urochordata ii. Systemic position 3. Cyclostomata: i. General characteristics ii. Systemic position						1 credit





<b>UNIT 2</b>	<b>GENERAL TOPICS</b> 1. Aves: Structure of feathers, Types of feathers, Uses of feathers, 2. Migration: Reasons of migration, theories of migration, migration in birds and other vertebrates. 3. Adaptation of Marine mammals (Deep diving, swimming adaptation, thermoregulation, Water-conservation and sensory adaptations).	1 credit
<b>Unit 3</b>	<b>DEVELOPMENTAL BIOLOGY</b> 1. Types of eggs (with examples) and cleavage 2. Fertilization and parthenogenesis 3. Blastulation and Gastrulation 4. Three germ layers 5. Organogenesis	1 credit
<b>Suggested readings</b>		
1	Modern Text book of Vertebrates by R. L. Kotpal, Rastogi Publication, Meerut	
2	Chordata Zoology by E. L Jordan and P. S. Verma	
3	Integrated Principles of Zoology by Hickman	
4	Cell Biology, Genetics, Evolution & Ecology: Evolution and Ecology by Verma P.S. and Agarwal	
Note: Students may refer variety of material available online and on web-resources for further understanding.		



**KSKV Kachchh University, Bhuj - Kachchh**  
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**SEMESTER IV:**  
**Paper MJ ZOO 404-P: GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY**

<b>PRACTICAL (Credit- 1)</b>						
<b>Course Outcome</b>						
After the completion of the course the students will be able to: Develop skills for studying physiology and bodily process basics, observational skills and field learning. Also they will be able to understand the digestive mechanism and histology. They will learn preparing small reports and field observations at first year basic level.						
<b>DISCIPLINE SPECIFIC CORE COURSE</b>						
	<b>SEMESTER</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>PRACTICAL</b>		
				<b>Credits</b>	<b>Practical</b>	<b>INTERNAL/ External</b>
<i>Practical</i>	B.Sc-IV	<i>MJ ZOO 404- P</i>	<b>GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY</b>	1	30 hrs	<i>25 (15+10) Marks</i>

The basic aim to introduce the animal diversity and identification skill of student.

Practical 1: Study of Phylum Cephalochordata (Amphioxus)

Practical 2: Study of Phylum Urochordata

(Ascidia, Salpa, Doliolum, Pyrosoma, Oikopleura)

Practical 3: Study of phylum Cyclostomata (Lamprey, Hagfish)

Practical 4: Study of structure and types of feathers in birds

(through charts/slide preparation)

Practical 5: To study Types of eggs. (through charts/slide preparation)

Practical 6: To study Types of eggs. (through charts/slide preparation)

Practical 7: To study Blastulation and Gastrulation. (through charts/slide preparation)

Practical 8: To study Organogenesis. (through charts/slide preparation)



**KSKV Kachchh University, Bhuj - Kachchh**  
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**SEMESTER-IV: MJ ZOO 404-P: GENERAL CHORDATA AND DEVELOPMENTAL BIOLOGY**

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 10 Marks

**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Describe the structure and type of given feather.	02
Exercise 2: Draw labelled diagram as per instruction – Developmental Biology	02
Exercise 3. Do as directed (1 marks each)	04
1. Identify and describe	
2. Identify and describe	
3. Identify and describe	
4. Identify and describe	
Exercise 4. a. <i>Viva-voce</i>	01
b. Journal	01
<b>TOTAL</b>	<b>10</b>

**Note:**

- **Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical**
- **Certified journal will be compulsory for appearing in Univ. Practical exam**
- **Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students.**



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-IV (Zoology MAJOR)**  
**MJ ZOO 405: ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY**

<b>THEORY (Credit 3)</b>							
<b>Course Outcome (Objectives)</b>							
After the completion of the course the students will be able to: Develop understanding about the classification and diversity of different invertebrate phylum and classification system. Learn basic principles of ecology. Develop skills of presentations and narration using computer & multimedia.							
<b>DISCIPLINE SPECIFIC CORE COURSES (MAJOR)</b>							
	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	Internal	External
	B.Sc. IV	MJ ZOO 405	<b>ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY</b>	3	45	35 Marks	40 Marks
UNIT	TOPIC						No.Of Credits/Lectures (45hrs)
UNIT-1	<b>ECOLOGY</b> <ul style="list-style-type: none"> <li>• Marine Ecosystem in detail: Animals of intertidal area, challenges to intertidal fauna,</li> <li>• Deep sea environment and adaptations, hydrothermal vents</li> <li>• Mangrove Ecosystem, its ecological role, status of mangroves in India and Gujarat</li> </ul>						1 credit
UNIT 2	<b>EVOLUTION</b> <ul style="list-style-type: none"> <li>• Variation: Types of variation, Causes of variation</li> <li>• Isolation: Mechanism of isolation, Types of isolation, Geographical isolation, Reproductive isolation, Pre zygotic isolation, Post zygotic isolation, Origin of isolation.</li> <li>• Speciation: Definition, Allopatric, Peripatric, Parapatric, sympatric</li> </ul>						1 credit



<b>Unit 3</b>	<b>UNIT III: COMPARATIVE ANATOMY</b> <ul style="list-style-type: none"> <li>• Comparative anatomy of Heart</li> <li>• Comparative anatomy of Brain</li> <li>• Comparative anatomy of kidney</li> </ul>	1 credit
<b>Suggested readings</b>		
1	Organic Evolution (Evolutionary Biology). V. B. Rastogi, Rastogi Publications, Meerut.	
2	Integrated principals of Zoology, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.	
3	Modern Text Book Of Zoology: Invertebrates By R.L. Kotpal	
4	Modern Text Book of Zoology: Vertebrates By R. R. Kotpal	
5	Cell Biology, Genetics, Evolution & Ecology: Evolution and Ecology by Verma P.S. and Agarwal	
6	Ecology and Environment, P. D. Sharma, Rastogi Publications, Meerut.	
7	Fundaments of Ecology by E P Odum	
Note: Students may refer variety of material available online and on web-resources for further understanding.		



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER IV: MAJOR**  
**Paper MJ ZOO 406-P: ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY**

<b>PRACTICAL (Credit- 1)</b>						
<b>Course Outcome</b>						
After the completion of the course the students will be able to: Develop skills for studying the animal characters, observational skills and field learning. They will learn preparing small reports and field observations at first year basic level.						
<b>DISCIPLINE SPECIFIC CORE COURSE</b>						
	<i>SEMESTER</i>	<i>COURSE CODE</i>	<i>COURSE TITLE</i>	<i>PRACTICAL</i>		
				<i>Credits</i>	<i>Lectures</i>	<i>INTERNAL/ External</i>
<i>Practical</i>	B.Sc-IV	<i>MJ ZOO 406- P</i>	<b>ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY</b>	1	30 hrs	25 (15+10) Marks

Practical 1: Study of Marine ecosystem

Practical 2: Plotting of Mangrove distribution on Maps (Gujarat and India)

Practical 3: Study of selected intertidal animals and their characters  
(Fiddler crab, Trocus, Neries, Sabella, Hermit crab, barnacles, sea anemone)

Practical 4: Study of different types of marine turtle.

Practical 5: Study of some important fauna of Kachchh.  
(GIB, Spiny tailed lizard, Wolf, Flamingoes and any other relevant may be added).

Practical 6: Study of Variations using said experiment/example

Practical 7: Study of Comparative anatomy of Heart

Practical 8: Study of Comparative anatomy of Brain

Practical 9: Study of Comparative anatomy kidney





**KSKV Kachchh University, Bhuj - Kachchh**  
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**SEMESTER-IV: MJ ZOO 406-P: ECOLOGY, EVOLUTION AND COMPARATIVE ANATOMY**

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 10 Marks

**Total Marks: 10**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Show distribution of mangroves on given map.	02
Exercise 2: Draw labelled diagram of given ecosystem.	02
Exercise 3. Do as directed (1 marks each)	04
1. Identify and describe	
2. Identify and describe	
3. Identify and describe	
4. Identify and describe	
Exercise 4. a. <i>Viva-voce/Field report</i>	01
b. Journal	01
TOTAL	10

**Note:**

- **Univ. Practical exam will be of 20 Marks (converted to 10 Marks in result). Duration 3 hrs and more depending on practical**
- **Certified journal will be compulsory for appearing in Univ. Practical exam**
- **Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students.**



**SEM-IV MAJOR AND MINOR ZOOLOGY**  
**KSKV Kachchh University, Bhuj - Kachchh**  
 (Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER-IV (Zoology Minor)**  
**Paper MN ZOL 407: ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY**

<b>THEORY (Credit 3)</b>							
<b>Course Outcome (Objectives)</b>							
After the completion of the course the students will be able to: Develop understanding about the classification and diversity of different invertebrate phylum and classification system. Learn basic principles of ecology. Develop skills of presentations and narration using computer & multimedia.							
<b>DISCIPLINE SPECIFIC CORE COURSES (MINOR)</b>							
	SEMESTER	COURSE CODE	COURSE TITLE	THEORY			
				Credits	Lectures	Internal	External
	B.Sc. IV	MN ZOL 407	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	3	45	35 Marks	40 Marks
UNIT	TOPIC						No.Of Credits/Lectures (45hrs)
UNIT-1	<b>ADAPTATIONS</b> Introduction to adaptation. Details of following adaptations with suitable examples 1. Arboreal Adaptation 2. Aquatic adaptation 3. Cursorial adaptation 4. Fossorial adaptation						1 credit
UNIT 2	<b>ANIMAL BEHAVIOR</b> 1. Parental care – in general - Case studies Pisces, amphibians, repti mammals 2. Adaptation of feets in Birds 3. Adaptation of beak in birds 4. Variation and Mimicry 5. Darwin theory of Natural selection						1 credit



<b>Unit 3 ZOOGEOGRAPHY</b>	1. Introduction 2. Brief account of Zoogeographical realms with mammalian fauna a. Australian Region b. Oriental Region c. Neotropical Region d. Ethiopian Region e. Nearctic Region f. Palaearctic Region 3. Biogeographic Zones of India	1 credit
<b>Suggested readings</b>		
1	Biology of the Invertebrates, J. A. Pechenik, Tata-McGraw Hill Company, Ltd, New Delhi.	
2	Modern Text book of Vertebrates by R. L. Kotpal • Genetics by P. K. Gupta • A Manual of Zoology Vol. I & II by Ekambernath Ayar	
3	Modern Text Book Of Zoology: Invertebrates By R.L. Kotpal	
4	Modern Text Book of Zoology: Vertebrates By R. R. Kotpal	
5	Animal Behavior by V. K. Agrawal. S. Chand Publishing.	
6	Concepts of Zoogeography and Wildlife by Dr. Umesh Bharti and Dr. Ravneet Kaur. Integrated publications	
Note: Students may refer variety of material available online and on web resources for further understanding.		



**KSKV Kachchh University, Bhuj - Kachchh**  
(Effective from June 2024-25 UNDER NEP-2020)

**SEMESTER IV:**

**Paper MN ZOL 408-P: ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY**

<b>PRACTICAL (Credit- 1)</b>						
<b>Course Outcome</b>						
After the completion of the course the students will be able to: Develop skills for studying the animal characters, observational skills and field learning. They will learn preparing small reports and field observations at first year basic level.						
<b>DISCIPLINE SPECIFIC CORE COURSE</b>						
	SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
				Credits	Lectures	INTERNAL/ External
Practical	B.Sc - IV	MN ZOO 408- P	ADAPTATIONS, BEHAVIOR AND ZOOGEOGRAPHY	1	30 hrs	25 (15+10) Marks

The basic aim to introduce the animal diversity and identification skill of student.

Practical 1: Study of Arboreal adaptations with suitable examples

Practical 2: Study of Aquatic adaptations with suitable examples

Practical 3: Study of Cursorial adaptations with suitable examples

Practical 4: Study of Fossorial adaptations with suitable examples

Practical 5: Study Parental care in different animals with suitable examples

Practical 6: Study of various types of feet in birds

Practical 7: Study of various types of beaks in birds

Practical 8: Marking various zoogeographic zones on the map. (Using world map)

Practical 9: Zoogeographic distribution of mammalian fauna on map. (Using world map) (Study of ecosystems will be using chart/multimedia and /or field visits)

**Note:** Documentation of practical and field reports in journals is must.  
(Univ. Practical pattern will be as per MAJ ZOO 402-P pattern)

