KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY,
BHUJ.

Year: 2025-2026

B.Sc (Honours)

ZOOLOGY

(With Research /Without Research)

Semesters : V and VI
(Exit option)

FACULTY OF SCIENCE

SYLLABUS

Curriculum as per UGC Guideline
Framed according to National Education Policy (NEP) - 2020
With effect from June – 2025 (and thereafter)

B.Sc. (Honours) Zoology Programme

(With Research/without Research)

NEP-2020

With effect from June – 2025 (and thereafter)

FACULTY OF SCIENCE

Subject: ZOOLOGY

B. Sc. Semesters: V AND VI

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.

Sr. No.	Type of Award	Stage of Exit	Mandatory Credits to be secured for the Award
1	Certificate in the Discipline	After successful completion of1st Year	44 + 4
2	Diploma in the Discipline	After successful completion of1st and 2nd Years	88 + 4
3	B.Sc. in Zoology	After successful completion of1st, 2nd and 3rd Years	132
4	B.Sc. (Honours with Research/without Research) in Zoology	After successful completion of1st, 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 fulfil 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.

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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. V- AND VI-Year Degree Course in Zoology

- ✓ This course will enable students to learn avenues in Zoology.
- ✓ The third-year syllabus can help students to get ready for further studies and research.
- ✓ 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

3rd year structure (Zoology)

Year	Semester	Course Code	Paper Title	Credits	Marks CA UA		Total
					CA	UA	
	Sem-V	MJZO 501	General Chordata (Theory)	3	35	40	75
		MJZO 502 (Practical)	General Chordata (Practical)	1	15	10	25
		MJZO-503 (Theory)	Ecology and Evolution	3	35	40	75

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		MJZO-504 (Practical)	Ecology and Evolution (Practical)	1	15	10	25
		MJZO-505 (Theory)	Endocrinology, Physiology and Ethology	3	35	40	75
		MJZO-506 (Practical)	Endocrinology, Physiology and Ethology (Practical)	1	15	10	25
		MNZO-507 (Theory)	Global Environmental issues & wildlife science	3	35	40	75
		MNZO-508 (Practical)	Global Environmental issues & wildlife science (Practical)	1	15	10	25
		MNZO 509 (Theory)	Cytology, Genetics and Biophysics	3	35	40	75
		MNZO 510 (Practical)	MNZO 510: Animal Diversity - Reptiles and Aves (Practical)	1	15	10	25
		SEC Zoology 511 **(Practical)**	Animal taxidermy, preservation and museum curation **(Practical)**	2	25	25	50
	Credits		**Total**	22	**Total Marks**		**550**
	Sem - VI	MJZO601 (Theory)	Non-chordate, Physiology & immunology	3	35	40	75
		MJZO602 (Practical)	Non-chordate, Physiology & immunology (Practical)	1	15	10	25
		MJZO-603 (Theory)	Environmental Pollution	3	35	40	75
		MJZO-604 (Practical)	Environmental Pollution (Practical)	1	15	10	25
		MJZO-605 (Theory)	Economic Zoology	3	35	40	75
		MJZO-606 (Practical)	Economic Zoology (Practical)	1	15	10	25
		MNZO-607 (Theory)	Basic Biochemistry	3	35	40	75
		MNZO-608 (Practical)	Basic Biochemistry (Practical)	1	15	10	25
		Internship (INZO609)	**Major specific internship**	4	40	60	100
	Credits		**Total**	**20**	**Total Marks**		**500**

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Internal Theory EVALUATION PATTERN

Theory Evaluation (75 Marks)	**Internal Exam (35 Marks)**	**External (40 Marks)**
	Internal Exam – 20 Marks	University Theory exam
	Assignment & Book review– 10 Marks	
	Attendance – 05 Marks	
Practical (25 Marks)	Internal 15 Marks	External (10 Marks)

*Field studies/visits will be part of Zoology curriculum.

Structure of the Question Paper for the University Exam

KSKV Kachchh University: BHUJ

Third YEAR B.Sc.: Semester: V AND VI (ONE)

For Major and MINOR Theory papers
(501, 503, 505, 507, 509 & 601, 603, 605, 607)
Total Marks: 40

PATTERN OF QUESTION PAPER

FOR SEMESTER-END EXAMS (Sem V AND VI)

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

- Types of questions for Question-4 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 will be part of practical.

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DETAILED SYLLABUS OF B.Sc. 3rd YEAR FOR DEGREE COURSE IN BASIC ZOOLOG

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(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER -V

MJZO501: General Chordata

(Course code: MJZO501) Credit: 3

	KSKV Kachchh University Bhuj - 370001			**ACADEMIC YEAR 2025-26**
Bachelor of Science: Regular Major				
Year	**III**	**MJZO 501: General Chordata**	**Credit**	**3**
Semester	**V**		**Hours**	**2**
Course Objectives	i).To understand the diversity and classification of Class Mammals. ii). To study anatomical and physiological systems through type studies of rats and sharks. iii). Explore flight adaptations in birds and structural types of fins and scales in fishes. iv). Learn behavioral adaptations like hibernation and aestivation.			
COURSE CONTENT / SYLLABUS				
UNIT-I	**Animal diversity (Chordata)** • Classification of Class Mammals: Characters and Classification, Egg layers (Monotrems), pouched mammals (Marsupials), Placental mammals • Type study: Rat o Digestive system, o Arterial system o Venous system o Reproductive system			**1**
UNIT-II	**Type study – Chordata (through charts/ models/ multimedia) (15 Marks)** • **Shark:** External characters, o digestive system, o male and female reproductive /Urinogenital system, o circulatory system, o nervous system. o Sensory organs of shark: Ampulla of Lorenzini, lateral line organ, Membranous labrynth			**1**

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UNIT-III	**General Topics** Aves: As a successful flying machine – flight adaptations (morphological and physiological) • Type of fins in fishes • Type of scale in fishes • Hibernation and Aestivation	**1**

REFERENCES BOOKS

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.	"Fish Biology" by C. B. Jørgensen or Lagler, Bardach, and Miller
4.	Integrated Principles of Zoology by Hickman
5.	"A Manual of Zoology Vol. II (Chordata)" by Ekambaranatha Ayyar and T.N. Ananthakrishnan

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

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(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER V
Paper MJZO502: General 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 animals to finer level.
2. Develop skills for studying the animal characters and observational skills

Semester	*Course Code*	*Course Title*	*PRACTICAL*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -V	**MJZO 502**	**General Chordata**	**1**	**30 hrs**	***25 (15+10) Marks****

***Examination:** If required, the examiners may the practical components may be administered out of 30(external) and 20(internal) marks, respectively, and subsequently scaled to 10 and 15 marks to fit the prescribed evaluation structure.*

Practical-1: To study class Mammalia using suitable examples. (Hedgehog, flying fox, Common langur, Jackal, leopard, Elephant, Blue bull, Dugong, Duckbilled platypus, Kangaroo, Koala.

Practical -2: To study digestive system of rat. (Using chart/virtual dissection/model)

Practical-3: To study arterial and venous system of rat. (Using chart/virtual dissection/model)

Practical -4: To study reproductive system of rat. (Using chart/virtual dissection/model)

Practical -5: Study of external characteristics of shark

Practical -6: Study of digestive system of shark

Practical -7: Study of circulatory system of shark

Practical -8: Study of Nervous system of shark

Practical -9: To perform mountings (Membranous labrynth and Ampulla of Lorenzini)

Practical-10: Study of caudal fins in fishes (Through charts and specimens)

Practical-11: Study of scales in fishes (through charts/slides/material)

Note: Practical 1 to 9: Using charts/multimedia/virtual dissection/models

Instructions:

- This is compulsory to record laboratory work in the journal. The journal is to be certified by the incharge concerned and the Head of the Department. Certified journal should be produced while appearing at the time of Practical examination. The field observations should be recorded in the journal.

Kranti Jyoti Shyamji Krishna Verma Kachchh University BHUJ - Kachchh 370001

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SEMESTER-V: MJZO502: General Chordata
INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL **MJZO502**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Draw/Demonstrate & explain the _____system of Rat	**02**
Exercise 2. Draw/Demonstrate & explain the _____system of Shark	**02**
Exercise 3. SPOTTINGS (1-4): Do as directed as per given instructions (1 marks each)	**04**
04 Spottings which may be identify and describe, Identify and classify, Identify and draw etc.	
Exercise 4. a. *Viva-voce*	**01**
b. Journal	**01**
TOTAL	**10**

Note: Univ. Practical exam can be of 30 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.

	KSKV Kachchh University Bhuj - 370001	ACADEMIC YEAR 2025-26

Bachelor of Science:
Major (Core)

Year	III	MJZO -503: Ecology and Evolution	Credit	3
Semester	V		Hours	2

40 Marks

COURSE OBJECTIVES (CO's):	• Gain knowledge of ecosystems, their types, biodiversity zones, and restoration methods. • Understand population ecology, diversity indices, and ecological field sampling techniques. • Learn key concepts of evolution, including the origin of tetrapods, speciation, and fossilization.

COURSE CONTENT / SYLLABUS

UNIT-I	**Ecology** • Desert Ecosystem, adaptations of desert living • Creeks, Lagoons types, Coral reefs (Overview, types, importance, coral bleaching, transplantation) • Biogeographic zones of India • Ecosystem degradation & Ecosystem restoration: Factors causing degradation, restoration methods, case studies.	1 Credit
UNIT-II	**Population Ecology** • Introduction & importance • Population pyramids (Age pyramids), factors affecting population, growth curves, carrying capacity • Metapopulation, Alpha, Beta and Gamma diversity • Field study/Sampling methods: Quadrate, transect sampling (line and belt transect), block counts (for birds), point count; Insect sampling (pit fall trap, light trap, Sticky traps, sweep netting etc.), Plankton sampling.	1 Credit

UNIT-III	**Evolution** • Origin of Tetrapoda: Ancestry and Phylogenetic Position (Lung fishes, Ichthyostega, Acanthostega), Devonian period and environment, adaptations for terrestrial life. • Dinosaurs: General description, Hypothesis/probable theories of extinction • Speciation, Darwin and Lamark theory, • General terms: Phylogeny, Cladistics, Homology & Analogy, Connecting links • General process of fossilization, Cast, molds, ambers etc	1 Credit

REFERENCES

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.	Fundamentals of Ecology, P. S. Odum, Saunders.
5.	P.D. Sharma – *Ecology and Environmental Biology (Rastogi Publications)*
6.	J.L. Chapman & M.J. Reiss – *Ecology: Principles and Applications*
7.	T.M. Smith & R.L. Smith – *Elements of Ecology*
8.	Verma & Agarwal – *Evolution and Genetics (S. Chand Publishing)*
9.	Mark Ridley – *Evolution*

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(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER - V

MJZO -504: Ecology and Evolution

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. Learn practically basic ecological concepts and theory of evolution with examples.

Discipline Specific Core Course						
Course	*Semester*	*Course Code*	*Course Title*	*Practical*		
				Credits	*Lectures*	*Total (Internal + External)*
Degree course	**B.Sc - V**	**MJZO504 (Practical)**	**Ecology And Evolution**	**1**	**30 Hrs**	***25 (15+10) Marks****

***Examination:** If required, the examiners may the practical components may be administered out of 30(external) and 20(internal) marks, respectively, and subsequently scaled to 10 and 15 marks to fit the prescribed evaluation structure.*

Practical-1: Study of animals showing desert adaptations (xerophytic living). (Indian camel, spiny tailed lizard, desert fox, Asiatic wild ass, Gila monster, Desert cat, Kangaroo rat.

Practical -2: To plot various biogeographic zones of India on map.

Practical-3: To record a case study of ecological restoration.

Practical -4: To study Transect and quadrate methods

Practical -5: To study various insect sampling methods

Practical -6: To study population growth curves

Practical -7: To study different types of Dinosaurs

Practical -8: To understand how phylogenetic trees represent evolutionary relationships using cladistics.

Practical-9: To study examples of connecting links

Practical -10: To study different kind of fossils

Field visits/Study tour

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

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SEMESTER - V:
MJZO504: Ecology And Evolution

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

Total Marks: 10

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Plotting biogeographic zones on map.	02
Exercise 2. Phylogeny & cladistic /Sampling methods	02
Exercise 3. SPOTTINGS (1-4): Do as directed as per given instructions (1 marks each)	04
04 Spotting which may be identify and describe, Identify and classify, Identify and draw etc.	
Exercise 4. a. Journal, Viva & Filed report	02
TOTAL	10

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.

	KSKV Kachchh University **Bhuj - 370001**	**ACADEMIC YEAR 2025-26**

Bachelor of Science:
(MAJOR)

Year	**III**	**MJZO -505: Endocrinology, Physiology and Ethology**	**Credit**	**3**
Semester	**V**		**Hours**	**2**

Course Objectives (CO's)	• To understand the structure, function, and hormonal regulation of major endocrine glands. • Learn the fundamentals of mammalian physiology including heart function, blood composition, and neural coordination. • To explore key animal behaviors including nesting, communication, reproductive strategies, and social behaviors like altruism.

COURSE CONTENT / SYLLABUS

UNIT-I	**Endocrinology**
	Introduction to Endocrine system, type of glands
	• Hormones: Definition, characteristics of hormones
	  o Structure and function of Endocrine glands:
	  o Pituitary
	  o Thyroid
	  o Adrenal
	  o Pancreas
	• Action and Feedback mechanism of Hormones
		1

UNIT-II	**Physiology** • Mammalian Heart: functioning, structure, cardiac cycle • Blood: Composition of blood, functions of blood o Mechanism of blood clotting • Nervous system and Coordination: Body control and coordination (overview), type of nervous system, comparison of Nervous system and Endocrine system, • Nerve cell: Structure, type, synapse, Reflex action and centers, • Neuro muscular coordination (overview), Conduction of nerve impulse	**1**
UNIT-III	**Ethology** • Nest making and type of bird nests • Colour learning in bees, Waggle dance in honey bee. • *Homing behavior in wasps* • Altruism: description and benefits. Examples In bees, bats, invertebrates, mammals • Reproductive behavior patterns: Lekking, lekking behavior and species, monogamy, polygamy, courtship displays (Colouration, sound, luring, appearance and dance, power etc.), mate selection.	**1**

REFERENCES

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1.	Guyton and Hall – Textbook of Medical Physiology
2.	Animal Behaviour by Mohan P Arora.
3.	Principles of Anatomy and Physiology, Tortora and Anagnostakos, 4th Edition.
4.	A Textbook of Animal Histology, A. K. Berry, Emkay Publications, Delhi.
5.	Textbook of Animal Physiology, A. K. Berry, Emkay Pub., New Delhi.
6.	P.S. Verma & V.K. Agarwal – Animal Physiology and Biochemistry (S. Chand Publishing)
7.	John Alcock – Animal Behavior: An Evolutionary Approach

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

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(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER-V: MAJOR

MJZO -506: Endocrinology, Physiology and Ethology

Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand mammalian endocrinology, physiology & general animal behaviour.
2. Develop skills for studying the animal characters and observational skills .

SEMESTER	*COURSE CODE*	*COURSE TITLE*	*PRACTICAL*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -V	**MJZO - 506 (Practical)**	**Endocrinology, Physiology and Ethology**	**1**	**30 hrs**	***25 (15+10) Marks***

Practical-1:	To study endocrine glands using Histological slides/charts/ multimedia (Pituitary, Adrenal, Thyroid, Pancreas)
Practical -2:	Study of internal structure of heart. (Using model/chart/ multimedia /virtual applications)
Practical-3	Measurement of blood pressure and heartbeat to understand cardiac cycle
Practical -4:	Determination of blood clotting time of own blood.
Practical -5:	Determination of your own bleeding time.
Practical -6:	Preparation of blood smear.
Practical -7:	Preparation of hemin crystal from own blood.
Practical -8:	To study neuro muscular coordination and reflexes. (through activities)
Practical -9:	Study of habituation using maze experiment.
Practical -10:	Study of different types of nests
Practical – 11:	To study animal behaviour showing altruism

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.
- The field observations should be recorded in the journal.

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SEMESTER - V: (MAJOR)

MJZO -506: Endocrinology, Physiology and Ethology

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 TS of given Endocrine gland	**02**
Exercise 2. Performing from Practical 2 to 8	**02**
Exercise 3. Identify and describe as per given instructions (1 marks each) 1. Identify and describe 2. Identify and describe 3. Identify and describe 4. Do as directed	**04**
Exercise 4. Journal, Viva	**02**
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*

	KSKV Kachchh University Bhuj - 370001	**ACADEMIC YEAR 2025-26**

**Bachelor of Science:
MINOR**

Year	**III**	**MNZO 507: Global Environmental issues & wildlife science**	**Credit**	**3**
Semester	**V**		**Hours**	**2**

Course Objectives	1. Increase sensitization towards environment conservation and efforts; 2. Understanding Indian wildlife; 3. Sensitization to environment issues useful for future exams & to be a good global citizen

COURSE CONTENT / SYLLABUS

UNIT-I	**International Treaties and Conventions** i. CITES ii. Ramsar Convention iii. Bonn Convention iv. UNCCD (UN Convention to Combat Desertification) v. Convention on Biological Diversity (CBD), Rio Earth Summit vi. United Nations Framework Convention on Climate Change (UNFCCC)	**1 Credit**

UNIT-II	**1.** National Park and Sanctuaries Example studies: Gir National Park, Marine National Park, Velavadar National Park, Jim Corbett National Park, Wild Ass Sanctuary. 2. Tools for Wildlife study: Binoculars, Cameras, Radio transmitters/receivers, Tranquilizers (guns and darts), Camera traps. 3. Wildlife Conservation: • 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**
UNIT-III	**Current Environmental Issues** 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**

REFERENCES BOOKS

1.	*Threatened animals of India*, B. K. Tikader, ZSI, Calcutta
2.	*Indian Mammals: Field guide by V. K.Menon*
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.	*Textbook of Environmental Studies for Undergraduate Courses, Fourth Edition. .Eric Bharucha*

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

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(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER V

(Minor)

MNZO-508: Global Environmental issues & wildlife science

Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand and identify taught about environment issues. They will learn Indian Environment useful in future competitive exams
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.

DISCIPLINE SPECIFIC CORE COURSE

COURSE	SEMESTER	CODE	COURSE TITLE	Credits	PRACTICAL	Total (Internal + External)
B.Sc	B.Sc. V	MNZO 508	Global Environmental issues & wildlife science	1	30 Hrs	25 (15+10) Marks

Practical Topics:

- **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 parkmaps.
- **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 rump Vulture, One horned Rhino, Lion tailed macaque, Kashmiri Red Stag, Nilgiri Tahr) 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 chinkara, 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 mandatory 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 practical examination.
- The field observations should be recorded in the journal.

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER - V:

MNZO-508: Global Environmental issues & wildlife science

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MNZO508

Instructions: Strictly follow the instructions given by examiner(s).		Marks
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
TOTAL		10

Note: Univ. Practical exam can be of 30 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*

	KSKV Kachchh University **Bhuj - 370001**	**ACADEMIC YEAR 2025-26**

Bachelor of Science:
Minor

Year	**III**	**MNZO 509:** Animal Diversity - Reptiles and Aves	**Credit**	**3**
Semester	**V**		**Hours**	**2**

Course Objectives	1. Study and understanding of Reptilian and avian classification 2. Study of type specimen to represent the phylum and their systems

COURSE CONTENT / SYLLABUS

UNIT-I	**Classification upto Order/family with suitable examples:** i. **Class–Reptilia**: Characters and classification • Venomous snakes of India & general account • Biting mechanism of Snake ii. **Class -Aves**: Characters and classification • flight adaptations (morphological and physiological) ((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))	**1 Credit**
UNIT-II	**TYPE STUDY – CHORDATA – Calotes (*Calotes versicolor*) (THROUGH CHARTS/ MODELS/ MULTIMEDIA)** i. Classification ii. Habit & Habitat iii. External characters iv. Digestive System v. Circulatory System vi. Urinogenital system	**1 Credit**
UNIT-III	***TYPE STUDY – CHORDATA – Pigeon (Columba livia) (THROUGH CHARTS/ MODELS/ MULTIMEDIA) [15]*** *i. Classification* *ii. Habit & Habitat* *iii. External characters* *iv. Digestive System* *v. Respiratory System & Air Sacs* *vi. Brain* *vii. Reproductive System*	**1**

REFERENCES BOOKS	
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 Principles of Zoology*, C. P. Hickman, L. S. Roberts, and A. Larson, McGraw Hill Company, New York.

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER - V

(Minor)
PAPER MNZO 510: ANIMAL DIVERSITY - REPTILES AND AVES

Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Classify and identify diverse specimens of reptiles and birds as systems
2. understand the major organ systems of representative chordates

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL CREDIT
B.Sc -V	MNZO510	**Animal Diversity - Reptiles and Aves**	1

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)

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER-V: MNZO 510: Animal Diversity - Reptiles and Aves

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL **MNZO 510**

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. *Viva-voce*	01
b. Journal	01
TOTAL	10

Note: Univ. Practical exam can 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.

	KSKV Kachchh University **Bhuj - 370001**	**ACADEMIC YEAR 2025-26**

Bachelor of Science:

SKILL ENHANCEMENT COURSE (SEC)

(Practical based)

Year	**III**	**SECZO-511: Animal preservation, Taxidermy and Museum curation**	**Credit**	**3**
Semester	**V**		**Hours**	**2**

Course Objectives (CO's)	i. Develop hands-on skills in the collection, preservation, and documentation of invertebrate and vertebrate specimens, museum curation technique. ii. Gain practical knowledge of taxidermy processes including skinning, preserving, mounting, and finishing specimens.

COURSE CONTENT / SYLLABUS

UNIT-I	**Specimen Collection, Preservation & Basic Display Techniques** • **Collection and Preservation Techniques** o Collection and preservation of invertebrates (wet & dry preservation) o Collection and preservation of vertebrates o Record keeping, labeling and post preservation care • **Basic Specimen Preparation** o Whole mount preparation of small animals and animal parts o Alizarin preparation of small invertebrates o Preparation of resin-embedded specimens o Preparation of articulated skeletons	1 Credit

UNIT-II	**Advanced Taxidermy & Museum Display Techniques**
	• Demonstration of Taxidermy
	  ○ Techniques in Taxidermy: measuring, skinning, fleshing, preserving, form selecting and preparing specimens
	• Mounting procedures, finishing and painting/varnishing selected specimens
	• Construction of natural habitats and artistic display of mounted forms
	• Resin-embedded specimens (revisited for museum quality)- Plastination
	• Histological Techniques
	  ○ Preparation of sections using microtome and cryostat
	  ○ Visit to Departmental Zoological Museum or any related museum
		1 Credit

REFERENCES

1.	Charles K Reed, Chester A Reed. 2012. Guide to Taxidermy, Skyhorse; 1st edition; ISBN-13: 978-16160853912
2.	William Temple Hornaday. 2018. Taxidermy and Zoological Collecting: A Complete Handbook for the Amateur Taxidermist, Collector, Osteologist, Museum-Builder, Sportsman, and Traveller, Forgotten Books; ISBN-13: 978-0266412700
3.	Museum Management and Curatorship; Taylor Francis Online Journal
4.	University of Cambridge Museum of Zoology. 2017. Illustrations of Comparative Anatomy, Vertebrate and Invertebrate, for the Use of Students in the Museum of Zoology and Comparative Anatomy 2nd Edition

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

EVALUATION PATTERN for SEC

Internal (25 Marks)	External (25 Marks)
Internal Practical including Report & Submission	Univ. practical exam

KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY,
BHUJ.

Year: 2025-2026

B.Sc (Honours)

ZOOLOGY

(With Research /Without Research)

Semesters : VI

(Exit option)

FACULTY OF SCIENCE
SYLLABUS

MJZO -601: Non-chordate, Physiology & immunology
MJZO-602 : Non-chordate, Physiology & immunology (Practical)
MJZO -603: Environmental Pollution
MJZO -604: Environmental Pollution (Practical)
MJZO -605: Economic Zoology
MJZO -606: Economic Zoology (Practical)
MNZO 607: Basic Biochemistry
MNZO 608: Basic Biochemistry (Practical)
INTZO 609: Major specific internship

Curriculum as per UGC Guideline
Framed according to National Education Policy (NEP) - 2020
With effect from June – 2025 (and thereafter)

B.Sc. (Honours) Zoology Programme

	KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2025-26

Bachelor of Science:
MAJOR (MJ)

Year	III	MJZO -601: Non-chordate, Physiology & immunology	Credit	3
Semester	VI		Hours	2

Course Objectives (CO's)	To provide students with an understanding of animal diversity focusing on non-chordates, especially arthropods, and to explore key physiological processes in chordates such as osmoregulation, thermoregulation, and muscle function. The course also introduces the fundamentals of immunology, including immune responses and disorders.

COURSE CONTENT / SYLLABUS

UNIT-I	**Animal diversity (Non-Chordata): Type study and general topic** *Arthropoda*: Type – **Cockroach** (*Periplaneta americana*) – 1. Classification, Habits & Habitat 2. External characters, 3. Digestive system, 4. Excretory system, 5. Reproductive systems, 6. Nervous system, and Sense organs (compound eyes)	1 Credit
UNIT-II	**General Physiology Chordates** Osmoregulation, Osmoconformers and Osmoregulators, comparison of mechanisms adopted with respect to different habitats. 1. Removing the Products of Nitrogen Metabolism- ammonotelism, uricotelism, ureotelism, adaptations to balancing competing habitat demands 2. Thermoregulation- ectothermy, endothermy, animal adaptation to extreme temperatures 3. Muscular system: Type of muscles, function of muscular system, Structure of muscles, mechanism of muscle contraction	1 Credit

UNIT-III	**Immunology:** • Definition and overview • Cells and organs of immune system • Innate and adaptive immunity, inflammatory response • Antigen – Antibodies (Definition & Characteristics), Human immune system (Skin, lymph, blood, T-cells, B – Cells, Spleen, monoclonal antibodies), Antigen presentation and mechanism • Immunity disorders: Autoimmune diseases	**1 Credit**

REFERENCES

1.	R.L. Kotpal – Modern Textbook of Zoology: Invertebrates (Rastogi Publications)
2.	Barnes R.D. – Invertebrate Zoology
3.	P.S. Verma – *Animal Physiology (S. Chand Publishing)*
4.	Guyton and Hall – *Textbook of Medical Physiology*
5.	Kuby Immunology (by Owen, Punt, Stranford)
6.	B.S. Chauhan – *Immunology (Narendra Publishing House)*

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

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER VI

(MAJOR)
MJZO -602: Non-chordate, Physiology & immunology
Practical/ Lab course (Credit- 1)

Course Outcome
After the completion of the course the students will be able to:
1. Understand and learn about type invertebrate animal.
2. Students will learn about physiology and immune system

SEMESTER	*COURSE CODE*	*COURSE TITLE*	*PRACTICAL*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -VI	MJZO - 602 (Practical)	*Non-chordate, Physiology & immunology*	1	30 hrs	*25 (15+10) Marks*

Practical-1:	Study of external characteristics of cockroach
Practical -2:	Study of digestive system of cockroach
Practical-3	Study of Nervous system of cockroach
Practical -4:	Study of reproductive system of cockroach
Practical -5:	Temporary mountings of salivary glands, cornea of compound eyes.
Practical -6:	Study of various type of muscles. (Using permanent slide/chart/multimedia)
Practical -7:	Study of cell and organs of immune system (Using chart/multimedia)
Practical – 8:	To observe salinity of water using refractometer in different ecosystems and note down animals.
Practical-9:	Field observation: excretory material in various animal group (Reptiles-Birds- Mammals) and linking with environment (Self study)
Practical-10	Measurement of Muscle Fatigue (Hand Grip Dynamometer Method)
Practical-11	Study of Hibernation and aestivation using animal models/multimedia.
Practical -12:	Culturing artemia/plankton/paramecium (Observation study)

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KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)

SEMESTER - VI

MJZO-602: Non-chordate, Physiology & immunology

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Draw and demonstrate _____system of cockroach	02
Exercise 2. Muscles/ salinity related experiment	02
Exercise 3. Identify and describe as per given instructions (1 marks each) 1. Identify and describe 2. Identify and describe 3. Identify and describe	03
Exercise 4. Journal & Viva	3
TOTAL	**10**

Note: ***Univ. Practical exam can be of 30 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*

	KSKV Kachchh University Bhuj - 370001	ACADEMIC YEAR 2025-26

Bachelor of Science:
MAJOR(MJ)

Year	III	MJZO -603: Environmental Pollution	Credit	3
Semester	VI		Hours	2

Course Objectives (CO's)	To provide students with an understanding of the causes, types, and impacts of air, water, and soil pollution, along with their environmental and health consequences. The course also aims to explore pollution control measures, sustainable waste management practices, and real-world case studies for holistic environmental awareness.

COURSE CONTENT / SYLLABUS

UNIT-I	**Air Pollution** • Composition and structure of Atmosphere • Primary and Secondary Air pollutants and their sources, Smog, Effects of air pollution. • Acid rain formation, causes and consequences • Greenhouse effect, gases and climate change • Remedies and case studies	1 Credit
UNIT-II	**Water Pollution** • Global potable water sources: general scenario • Water Pollution: Sources: Point vs. non-point sources • Classification: Physical, chemical, and biological pollution • Sources and pollutants: Organic, inorganic, industrial, thermal pesticides contamination. • Ground water contamination • Effect of water pollution on Aquatic life & human health • Waste water Treatment: Sewage and Effluent treatment • Conservation measures: Remedies, rain water harvesting	1 Credit

Librarian Shyam Krishna Verma Kachchh University BHUJ - Kachchh 370001

UNIT-III	**Soil/Land pollution** • Sources of Soil pollution: Agriculture activities, industrial activities, Urbanization and solid waste) Industrial solid wastes - Toxic metals like Cu, Pb, Ni. b) Solid wastes - Garbage, paper, glasses, metal cans, plastics, faeces. c) Agricultural sources - Wastes from cattle sheds & poultry farms, fertilizers, pesticides and fumigants.. Effect of soil pollution. Remedies • Solid waste: General scenario of the issue, various sources, its effect, sustainable use, management of solid waste. Management of hazardous waste. • Remediation of degraded soil, Sustainable agriculture practices.	**1 Credit**

REFERENCES

1.	Fundamentals of Ecology, P. S. Odum, Saunders.
2.	Ecology and Environment, P. D. Sharma, Rastogi Publications, Meerut.
3.	Environmental Pollution (Popular Science) , N. Manivasakan, National Book Trust, New Delhi.
4.	Elements of Environmental Polluton Control By O. P. Gupta. Khanna Book Publishing
5.	A Textbook of Environmental Chemistry and Pollution Control. By SS Dara

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

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KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER VI

MAJOR

MJZO -604: Environmental Pollution

Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand and learn about cell, genetics and chromosomes.
2. Develop laboratory skills on understanding instruments.

Semester	*Course Code*	*Course Title*	*Practical*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -VI	MJZO - 604	Environmental Pollution	1	30 hrs	*25 (15+10) Marks*

Practical-1:	Estimation of Total solids (TS), Total dissolved solids (TDS) & total suspended solids (TSS) from water sample.
Practical -2:	Estimation of Dissolved oxygen in given water sample
Practical-3:	Measurement of Soil and water pH
Practical -4:	Measurement of Turbidity using portable meter.
Practical -5:	Measure presence of particulate pollutants in the air using Dust fall jar.
Practical -6:	Measure presence of particulate pollutants in the air using Leaf surface dust test.
Practical -7:	Study of Soil organic matter & bulk density
Practical-8:	Study of solid waste/plastic waste & categorization graphs
Practical-9:	Study of local solid waste disposal site/polluted site. (Self-study)
Practical-10:	Case study: Best practice of solid waste management.

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KSKV Kachchh University, Bhuj - Kachchh
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SEMESTER - VI

MJZO -604: Environmental Pollution

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Water parameter TS/TDS/TSS/DO/Turbidity	02
Exercise 2: Soil parameters (pH/Organic matter/other)	03
Exercise 3. Measurement of particulate matter/Organic matter	02
Exercise 4. Journal & Viva	3
TOTAL	**10**

Note: ***Univ. Practical exam can be of 30 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*

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	KSKV Kachchh University **Bhuj - 370001**	**ACADEMIC YEAR 2025-26**

Bachelor of Science:
MAJOR

Year	**III**	**MJZO -605: Economic Zoology**	**Credit**	**3**
Semester	**VI**		**Hours**	**2**

Course Objectives (CO's)	To provide students with fundamental knowledge of apiculture, sericulture, and fisheries, emphasizing their biological basis, economic importance, and sustainable practices. The course aims to develop practical understanding of insect-based industries and aquaculture techniques used in traditional and modern contexts.

COURSE CONTENT / SYLLABUS

UNIT-I	**Apiculture** Introduction & history • Classification of *Apis*, Different species of honey bees. • Social structure & life history in honey bees. • Modern and traditional methods of beekeeping • Communication in honey bees. • Role of bees in agriculture and ecosystem, • Sustainable beekeeping practices • Bee products	1 Credit
UNIT-II	**Sericulture** Introduction. • Classification of *Bombyx mori*. • Introduction to different species of silkworms used for sericulture. • External features and Life cycle of *Bombyx mori*. • Sericulture industry: - Requirements for sericulture. - Mulberry. - Rearing of silkworm: Grainage management. - Post-cocoon processing. 2. Chemistry and uses of silk.	1 Credit
UNIT-III	**Fisheries** Fisheries: Overview, Types of fisheries: Inland, marine, estuarine, Economic importance of fisheries, 1. Induced breeding (only concept for short question) 2. Pond management (Aquaculture) 3. Processing and preservation of fishes 4. Modern and traditional fishing gears: Type of fishing boat, type of fishing net	**1 Credit**

REFERENCES

1. Elements of Biotechnology, P. K. Gupta, S. Chand & Company, Delhi

Shyamji Krishna Verma Kachchh University Bhuj - Kachchh 370001

2.	Economic Zoology, G. S. Shukla and V. B. Upadhyay, Rastogi Publications, Meerut.
3.	Economic and Applied Entomology, Kumar and Nigam, Emkay Pub., Delhi.
4.	S.N. Snodgrass (adapted by C. S. Kumar) – Apiculture (ICAR Publication)
5.	V.G. Jhingran – Fish and Fisheries of India (Hindustan Publishing)
6.	T.V.R. Pillay – Aquaculture: Principles and Practices (FAO/Blackwell Publishing)

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

Krantiguru Shyamji Krishna Verma Kachchh University ☆ BHUJ - Kachchh 370001

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SEMESTER VI

MAJOR

MJZO -606: Economic Zoology

Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand and economically important animals.
2. Learn about entrepreneurship or skill development from subject.

SEMESTER	*COURSE CODE*	*COURSE TITLE*	*PRACTICAL*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -VI	MJZO -606 (Practical)	Economic Zoology	1	30 hrs	*25 (15+10) Marks*

Practical-1:	Study of social structure of honey bee. (Using specimen/chart/photograph)
Practical -2:	Study of modern and traditional bee keeping methods. (by charts /specimens
Practical-3	Study of *Bombax mori* life cycle & sericulture process different instruments(by charts /specimens)
Practical -4:	Study of economically important freshwater fishes of Gujarat/India. (by charts /specimens)
Practical -5:	Study of economically important marine fishes of Gujarat/India. *(by charts /specimens)*
Practical -6:	Methods of processing and preservation of fish. *(by charts /specimens)*
Practical -7:	Study of some modern and traditional fishing gears. (by charts /specimens
Practical – 8:	Study of Major Agricultural & household Pests

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KSKV Kachchh University, Bhuj - Kachchh
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SEMESTER - VI

MJZO -606: Economic Zoology

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Apiculture/sericulture	02
Exercise 2. Marine and Freshwater fishes	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. Journal & Viva	3
TOTAL	**10**

Note: ***Univ. Practical exam can be of 30 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*

	KSKV Kachchh University **Bhuj - 370001**	**ACADEMIC YEAR 2025-26**

Bachelor of Science:
MINOR (MN)

Year	**III**	**MNZO-607: Basic Biochemistry**	**Credit**	**3**
Semester	**VI**		**Hours**	**2**

Course Objectives (CO's)	• The course aims to i). Understand the structure, classification, and biological roles of carbohydrates, proteins, and lipids. ii). To understand more about protein, amino acids and enzymes

COURSE CONTENT / SYLLABUS

UNIT-I	**Carbohydrates** Introduction, classification of carbohydrates, asymmetry o Monossaccharides: Definition and general formula, classification upto hexoses (with structure of appropriate examples). o Disaccharides: Definition, Classification based on glycosidic linkage, general description on Maltose, Lactose and Sucrose. o Polysaccharides: Definition, Classification (Only flow chart), General properties of Starch, Glycogen, Cellulose, Chitin and Hyaluronic acid. o Biological importance of carbohydrates	1 Credit
UNIT-II	**Proteins** - Classification of Proteins: o Based upon shape - Globular and Fibrillar o Based upon composition & solubility - Simple, Conjugated and Derived - Biological importance of proteins - Amino acids – In general	1 Credit

UNIT-III	**Lipids and Enzymes** - Lipids: Types of lipids, - Classification of Lipids (Simple, compound and derived), Properties of lipids - Biological importance of lipids - Enzymes – Definition, Types of enzymes, Properties of enzymes - Factors affecting enzyme activity/enzyme catalyzed reaction: - Temperature, b) pH, c) Inhibitors, d) Enzyme concentration, e) Substrate concentration	**1 Credit**

REFERENCES

1.	1. Elementary Biochemistry, J. L. Jain, S. Chand & Company, Delhi.
2.	Harper's Biochemistry, Lange, McGraw-Hill.
3.	Principles of Biochemistry, Lehninger, CBS Publications.
4.	Biochemistry, Stryer L., W.H. Freeman & Co..
5.	Cellular and Molecular Biology, De Robertis and De Robertis, Saunders Pub

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

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER VI

(Minor)
MNZO-608: Basic Biochemistry

Practical/ Lab course (Credit- 1)

Course Outcome
After the completion of the course the students will be able to:
1. Understand and learn to know biochemical process of Carbohydrates, protein & lipids.
2. Develop laboratory skills
3. Learn observational skills and demonstrate the same in journals and exams.

SEMESTER	*COURSE CODE*	*COURSE TITLE*	*PRACTICAL*		
			Credits	*Hours*	*Total (Internal + External)*
B.Sc -VI	MNZO-608	Basic Biochemistry	1	30 hrs	*25 (15+10) Marks*

Practical 1: Detection of Carbohydrates

Practical 2: Detection of Proteins

Practical 3: Preparation of atomic models of Carbohydrates. (as done in practical)

Practical 4: Preparation of atomic models of Proteins. (as done in practical)

Practical 5: Preparation of various graph for effect of temperature on enzymatic action.

Practical 6: Preparation of various graph for effect of pH on enzymatic action.

Practical 7: Preparation of various graph for effect of enzyme and substrate concentration on enzymatic action.

Practical 8: Study of paper chromatography technique

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.

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SEMESTER - VI:

MNZO-608: Basic Biochemistry

INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 10 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL **MNZO508**

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Detect any two constituents from the given unknown solution and show your tests to the examiner	**02**
Exercise 2. Prepare/Draw the atomic model of _____ and show it to the examiner.	**04**
Exercise 3. Preparation of _____graph for enzymatic reaction. / Paper chromatography	**02**
Exercise 4. Journal & Viva	**02**
TOTAL	**10**

Note: ***Univ. Practical exam can be of 30 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*

Bhuj - Kachchh 370001

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2025-26 UNDER NEP-2020)
SEMESTER VI

Sem -6

Paper code : INZO609

INZO609- INTERNSHIP IN MAJOR SPECIFIC COURSE

INTERNSHIP	Credit
Includes Dissertation/Project work/ Internship (other than self-institute)/ Review work/other relevant	Total credit: 04

The credit weightage for Internship/Apprenticeship/OJT is suggested to be 30 hrs. per credit if they have only practical exposure or lab-based activities. Accordingly, the students must dedicate required number of hours for the same. The guidelines offer scope for providing hands on learning with classroom experience. In case of field visit or experiential learning, 1 credit is equivalent to 40-45 Hours.

Both HEIs & Industries can decide mutually for the duration of classroom lecture and industry visit.

Credit allocation:

Details	Per hour	For earning 4 credit
Lab based activities or practical exposure	30hrs/ credit	120 hrs for paper
Field visit or experimental learning	40-45 hrs/credit	160-180 hrs per paper
Please refer 3.4.2 & 3.4.3 of SOP page no.		

Evaluation:

- **Marking system will be 60% and 40% for Supervisor and faculty respectively. 60% of the marking should be given by the external supervisor while 40% internal assessment will be based on viva and report submission.**

- **Report** of the training will be must for proper documentation.
- **Certificate** from SKP will be required on successful completion.

General Rules:

- The Internship or skill earning can be from any organization/industry/Govt. body/NGO/any other institute/ SKP (Skill Knowledge Provider) etc.
- For Industry or other institute internship please refer 3.4.3 of SoP.
- The concerned can issue a certificate or letter for work completion after successful completion of OJT/Internship/Apprenticeship activities by students.

Krantiguru Shyamji Krishna Verma Kachchh University BHUJ - Kachchh 370001