

Krantiguru Shyamji Krishna Verma
Kachchh University, Bhuj



SYLLABUS (NEP)

B.Sc. (Honours)
ZOOLOGY
(With Research/ Without Research)

Semesters: VII and VIII

A Curriculum of Zoology
Faculty of Science framed as per UGC Guideline
And norms of National Education Policy (NEP)-2020

With effect from June-2026 (and thereafter)



Paper And Credit Scheme For Zoology

For ZOOLOGY Semester - VII

Year	Semester	Course Code	Paper Title	Credits	Marks		Total
					CA	UA	
Fourth Year	VII	MJZO-701 (Theory)	Molecular Biology and Genetics	3	35	35	70
		MJZO-702P (Practical)	Molecular Biology and Genetics- PRACTICAL	1	15	15	30
		MJZO-703 (Theory)	Biophysics And Bioinstrumentation	3	35	35	70
		MJZO-704P (Practical)	Biophysics And Bioinstrumentation PRACTICAL	1	15	15	30
		MJZO-705 (Theory)	Forestry, Wildlife and Zoo Management	3	35	35	70
		MJZO-706P (Practical)	Forestry, Wildlife and Zoo Management- PRACTICAL	1	15	15	30
		Total Credits (Major)		12			300
		MNZO-707 (Theory)	Economic Zoology	3	35	35	70
		MNZO-708P (Practical)	Economic Zoology	1	15	15	30
		Total Credits (Minor)		4			100
		Major based Papers offered instead of OJT	OJT-ZO-709 Environmental Impact Assessment and Biodiversity Surveys	3	35	35	70
			OJT-ZO-710: Environmental Impact Assessment and Biodiversity Surveys	1	15	15	30
			SEC based Practical OJTZO-Ecological Survey Techniques & Research Methods	2	25	25	50
		Total Credits OJT		6			150
		Total Credits		22			550



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ZOOLOGY Semester - VIII

Year	Semester	Course Code	Paper Title	Credits	Marks		Total
					CA	UA	
Fourth Year	VIII	MJZO-801 (Theory)	Disease Biology & Toxicology (Practical)	3	35	35	70
		MJZO-802 (Practical)	Disease Biology & Toxicology - PRACTICAL	1	15	15	30
		MJZO-803 (Theory)	Occupational Health Hazards and Biosafety	3	35	35	70
		MJZO-804P (Practical)	Occupational Health Hazards and Biosafety - PRACTICAL	1	15	15	30
		MJZO-805 (Theory)	Environmental Issues and Marine Environmental Management	3	35	35	70
		MJZO-806 (Practical)	Environmental Issues and Marine Environmental Management - PRACTICAL	4	15	15	30
		Total Credits (Major)		12			300
		MNZO-807 (Theory)	Parasitology, Genetics and Biostatistics	3	35	35	70
		MNZO-808P (Practical)	Parasitology, Genetics and Biostatistics - PRACTICAL	1	15	15	30
		Total Credits(Minor)		4			100
		Dissertation /OJT (Major based)	DSZO-809*	6	75	75	150
		Total Credits OJT		6			150
		Total Credits		22	275	275	550

*** Student with Research course will have Dissertation and those without research option will have to opt for OJT.**



EVALUATION PATTERN

Theory Evaluation (75 Marks)	Internal Exam (35 Marks)	External (35 Marks)
	Internal Exam – 20 Marks	University Theory exam
	Assignment – 10 Marks	
	Attendance – 05 Marks	
Practical (30 Marks)	Internal 15 Marks	External (15 Marks)

Structure of the Question Paper (Theory) for the University Exam

KACHCHH UNIVERSITY: BHUJ

FOURTH YEAR B.Sc.: NEP: SEMESTER: VII (SEVEN)

ZOOLOGY

For Major and MINOR Theory papers

PAPER CODE NO: MJZO-701/703/705, MNZO-707 and all of sem-8.

Total Marks: 35, Passing standard: 14 Marks [Time: 90 minutes]

PATTERN OF QUESTION PAPER

FOR SEMESTER-END EXAMS

Questions	Section	Marks
Question-1 (Unit-I)	(Descriptive - Essay type - Short notes <i>with internal option</i>)	10 marks
Question-2 (Unit-II)	--do--	10 marks
Question-3 (Unit-III)	--do--	10 marks
Question – 4 (Unit-I, II & III)	Total 06 short questions of 1 mark, each unit will have 2 questions. students will attempt any 05 out of 06	05 Marks

- *Question 4 may include one-line answers/ two-line answers/ definitions/ reasoning/ derivations of equations/ derivations of sums/ drawing small figures/ matching the figures/ fill in the blanks/ multiple choice question/ one word answer/ match the pairs/Chemical reaction etc.*
- *OJT can be carried out at any NGO/Institute/entrepreneur/industry etc.*
- *The language of the question papers shall be English.*

B. Pandey



KACHCHH UNIVERSITY: BHUJ

FOURTH YEAR B.Sc.: NEP: SEMESTER: VII (SEVEN)

ZOOLOGY

KSKV Kachchh University, Bhuj - Kachchh

(Effective from June 2026-27 UNDER NEP-2020)

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: Major					
Year	IV	MJZO 701: Molecular Biology and Genetics	Credit	3	
Semester	VII		Hours	2	
Course Objectives		1). To understand DNA structure, genome organization and mechanisms maintaining genetic stability. 2).To explain molecular processes involved in gene expression and regulation. 3).To introduce principles of molecular genetics, mutations and mutagenesis. 4).To familiarize students with recombinant DNA technology, PCR, sequencing and genome-based studies.			
COURSE CONTENT / SYLLABUS					
UNIT-I		• DNA structure and genome organization • Chromatin and chromosome organization • DNA replication • DNA Proof reading and repair			1
UNIT-II		Gene expression • Gene expression definition, Stages (Transcription, splicing, Translation • Genetic code and translation • Gene regulation (prokaryotes and eukaryotes) • Profiling and techniques (Overview and different methods)			1
UNIT-III		Molecular genetics • Mutation and mutagens • Recombinant DNA technology • PCR and sequencing • Human Genome Project			1
REFERENCES BOOKS (also other relevant reading resources can be used)					
1.	Molecular Biology – P.S. Verma & V.K. Agarwal				
2.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology – P.S. Verma & V.K. Agarwal				
3.	Genetics – P.K. Gupta / Genetics – V.B. Rastogi				
4.	Integrated Principles of Zoology by Hickman				
5.	Molecular Biology and Biotechnology – J.M. Walker & E.B. Gingold				



KSKV Kachchh University, Bhuj - Kachchh
SEMESTER VII
Paper MJZO702:
Practical/ Lab course (Credit- 1)

Course Outcome

Upon completion of the course, students will be able to:

- Explain DNA organization, replication and repair mechanisms.
- Describe gene expression and regulation in prokaryotic and eukaryotic systems.
- Analyze mutations and their role in genetic variation and disease.
- Interpret applications of molecular tools and genome technologies in modern biology.

Semester	Course Code	Course Title	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -VII	MJZO 702	Molecular Biology and Genetics	1	30 hrs	30 (15+15) 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 DNA model (using virtual tool/ diagram/model)

Practical -2: To study DNA isolation (performance/demonstration)

Practical-3: Agarose gel demonstration

Practical -4: Karyotype/genetic problem solving

Practical -5: Bioinformatics database exercises (NCBI/BLAST)

Practical -6: Pedigree analysis

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.

SEMESTER-VII: MJZO702:
INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MJZO702
Exercises of 11 Marks related to practical and Journal and viva (04 marks)

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

KACHCHH UNIVERSITY: BHUJ
FOURTH YEAR B.Sc.: NEP: SEMESTER: VII (SEVEN)
ZOOLOGY

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

	KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: Major				
Year	IV	MJZO 703: BIOPHYSICS AND BIOINSTRUMENTATION	Credit	3
Semester	VII		Hours	2
Course Objectives	1. To understand physical principles governing biological systems. 2. To develop knowledge of biomolecules, membrane transport and energetics from a biophysical perspective. 3. To introduce modern biophysical techniques and bioinstrumentation used in biological research.			
COURSE CONTENT / SYLLABUS				
UNIT-I	Fundamentals of Biophysics and Biological Energetics • Introduction to Biophysics ○ Scope and significance of biophysics ○ Interdisciplinary nature of biophysics • Basic Physical Principles in Biology ○ Units and measurements ○ Diffusion, osmosis and surface tension ○ Viscosity and biological significance • Membrane biophysics & Bioelectricity: Fluid mosaic model, Active and Passive transport, action potential and conduction of nerve impulse.			1
UNIT-II	Microscopy • History and development of microscopy • Principles of microscopy • Components and working of microscope • Compound light microscope • Stereo and dissecting microscope • Phase contrast microscopy • Fluorescence microscopy			1



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UNIT-III	Bioinstrumentation and Biophysical Techniques 1. Spectroscopic Techniques - o Principles and applications of spectrophotometry - o Colorimetry - o Fluorescence microscopy (basic concept) 2. Separation Techniques - o Centrifugation - o Chromatography - o Electrophoresis 3. Advanced Bioinstrumentation - o pH meter - o Applications of imaging and analytical techniques in Zoology	1
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REFERENCES BOOKS

1.	Ackerman E. – Biophysical Science
2.	Cotterill R. – Biophysics: An Introduction
3.	Genetics – P.K. Gupta
4.	Integrated Principles of Zoology by Hickman
5.	Molecular Biology and Biotechnology – J.M. Walker & E.B. Gingold
6.	Nelson & Cox – Lehninger Principles of Biochemistry
7.	Upadhyay & Nath – Biophysical Chemistry
8.	Wilson & Walker – Principles and Techniques of Biochemistry and Molecular Biology

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
SEMESTER VII

Paper MJZO704:
Practical/ Lab course (Credit- 1)

Course Outcome

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

- Explain physical principles underlying biological processes.
- Understand thermodynamics and membrane biophysics in living systems.
- Describe principles and applications of major biophysical instruments.
- Perform basic biophysical experiments and interpret scientific data.

Semester	Course Code	Course Title	PRACTICAL		
			Credits	Hours	Total (Internal + External) Marks*
B.Sc -VII	MJZO 704	BIOPHYSICS AND BIOINSTRUMENTATION	1	30 hrs	30 (15+15)

**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.*

- 1.Preparation of standard solutions and measurement concepts.
- 2.Demonstration and study of diffusion and osmosis.
- 3.Determination of pH using pH meter.
- 4.To understand colorimeter/spectrophotometer.
- 5.Separation of pigments/amino acids by paper or thin-layer chromatography.
- 6.Demonstration of electrophoresis techniques.
- 7.Study of centrifuge and separation principles.
- 8.Micrometry and microscopic measurements.
- 9.Laboratory record, data interpretation and viva voce.

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.



KSKV Kachchh University, Bhuj - Kachchh

SEMESTER-VII:
MJZO704: BIOPHYSICS AND BIOINSTRUMENTATION
INTERNAL EVALUATION: 15 Marks
EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MJZO704

Instructions: Strictly follow the instructions given by examiner(s).		Marks
Exercise 1: Demonstration/Performance/		04
Exercise 2. Do as directed		03
Exercise 3. Do as directed spotting		04
Exercise 4. a. <i>Viva-voce</i>		02
b. Journal		02
TOTAL		15

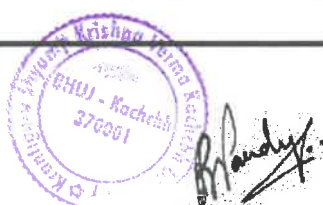
- *Certified journal will be compulsory for appearing in Univ. Practical exam*
- Excursion/ Project work/ Visit/ Tour/ report and submission of specimens / Charts/ Model/ Fresh Material/ other activity (Given by teacher or as a part of Syllabus) will be mandatory for all the students. Field learning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



B. Pandey

KACHCHH UNIVERSITY: BHUJ
FOURTH YEAR B.Sc.: NEP: SEMESTER: VII (SEVEN)
ZOOLOGY
KSKV Kachchh University, Bhuj - Kachchh
 (Effective from June 2025-26 UNDER NEP-2020)

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: Major					
Year	IV	MJZO 705: Forestry, Wildlife and Zoo Management		Credit	3
Semester	VII			Hours	2
Course Objectives		1. To understand principles of forestry, forest ecosystem and sustainable forest management.			
		2. To familiarize students with wildlife conservation strategies and protected area management.			
		3. To introduce zoo management, conservation breeding and regulatory frameworks related to biodiversity conservation.			
		4. To develop understanding of environmental policies and legal provisions governing forest and wildlife resources			
COURSE CONTENT / SYLLABUS					
UNIT-I		1. Introduction to Forestry			1
		o Scope and importance			
		o Forest types of India			
		o Forest ecosystem and ecological services			
		2. Forest Management			
o Principles of sustainable forest management					
o Social forestry and agroforestry					
o Joint Forest Management (JFM)					
UNIT-II		3. Forest Conservation			1
		o Forest degradation and threats			
		o Afforestation and restoration			
		o Forest conservation policies and legislation			
		Wildlife Conservation and Environmental Governance			
1. Wildlife Conservation					
o Biodiversity conservation principles					
o Protected areas: National Parks, Wildlife Sanctuaries and Biosphere Reserves					
o Wildlife corridors and habitat management					
2. Conservation Strategies					
o In situ conservation					
o Ex situ conservation					
o Captive breeding and species recovery programmes					
3. Coastal and Marine Conservation					
o Coastal Regulation Zone (CRZ)					



	○ Exclusive Economic Zone (EEZ) ○ Marine biodiversity conservation and management	
UNIT-III	Zoo Management and Conservation Authorities 1. Zoo Management ○ Principles and objectives of zoo management ○ Animal housing, nutrition and enrichment ○ Zoo health care and record keeping 2. Conservation Breeding and Zoo Role ○ Zoo-based conservation ○ Genetic management in captivity ○ Reintroduction and rehabilitation 3. Regulatory Bodies and Policies ○ Central Zoo Authority (CZA): objectives and functions ○ Wildlife Protection Act and related provisions ○ TRAFFIC, CITES	1
REFERENCES BOOKS		
1.	Negi S.S. – Forestry and Wildlife Management	
2.	Sharma P.D. – Ecology and Environment	
3.	Rajesh Gopal – Wildlife Conservation and Management	
4.	Government Manuals on Forest and Zoo Management	
5.	Wildlife Protection Act and CZA Guidelines	
6.	CZA Guidelines	
7.	Wildlife Biology: An Indian Perspective – Goutam Kumar Saha & Subhendu Mazumdar	
8.	Forest Ecology of India – S.S. Negi	

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



B. Pandey

KSKV Kachchh University, Bhuj - Kachchh
SEMESTER VII
Paper MJZO706:
Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Explain principles of forestry and forest management practices.
2. Describe wildlife conservation strategies including in situ and ex situ approaches.
3. Interpret roles of conservation agencies and legal frameworks in biodiversity protection.
4. Apply concepts of zoo and wildlife management for conservation planning.

Semester	Course Code	Course Title	PRACTICAL		
			Credits	Hours	Total (Internal + External) Marks*
B.Sc -VII	MJZO 706	Forestry, Wildlife and Zoo Management	1	30 hrs	30 (15+15)

**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.*

1. Identification and study of forest types and vegetation.
2. Plotting of various forest types on map of India.
3. Preparation of Wildlife Corridors using case study.
4. Preparation of forest and wildlife management maps/charts.
5. Study of CRZ and EEZ using maps and secondary data.
6. Zoo design and animal enclosure planning exercise.
7. Documentation and record-keeping formats used in zoo management.
8. Field visit to forest area/zoo/nature reserve and report preparation.
9. Case studies on protected areas and conservation projects.

(Other activities in journals can be added if required by teacher)

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.



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KSKV Kachchh University, Bhuj - Kachchh

SEMESTER-VII:

MJZO706: Forestry, Wildlife and Zoo Management

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL MJZO704

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Do as directed	04
Exercise 2. Do as directed	03
Exercise 3. Do as directed spotting	04
Exercise 4. a. <i>Viva-voce</i>	02
b. Journal	02
TOTAL	15

- *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.



R. Pandey

	KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: MAJOR				
Year	IV	MNZO -707: Economic Zoology	Credit	3
Semester	VII		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 <i>Apis</i>, 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 <i>Bombyx mori</i>. • Introduction to different species of silkworms used for sericulture. • External features and Life cycle of <i>Bombyx mori</i>. • Sericulture industry: - Requirements for sericulture. - Mulberry. - Rearing of silkworm: Grainage management. - Post-cocoon processing.			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				



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.

MAJOR
MNZO -708: Economic Zoology
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.

<i>SEMESTER</i>	<i>COURSE CODE</i>	<i>COURSE TITLE</i>	<i>PRACTICAL</i>		
			<i>Credits</i>	<i>Hours</i>	<i>Total (Internal + External)</i>
B.Sc -VII	MNZO - 708 (Practical)	Economic Zoology	1	30 hrs	30 (15+15) 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 <i>Bombax mori</i> 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)

Certified journals at the time of University Practical exams are compulsory.

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KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2026-27 UNDER NEP-2020)

SEMESTER - VI

MNZO -708: 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		03
Exercise 2. Marine and Freshwater fishes		02
Exercise 3. Identify and describe as per given instructions (1.5 marks each)		06
1. Identify and describe		
2. Identify and describe		
3. Identify and describe		
Exercise 4. Journal & Viva		4
TOTAL		15

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



Mandya

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: MAJOR					
Year	IV	OJT-ZO -709: Environmental Impact Assessment and Biodiversity Surveys		Credit	3
Semester	VII			Hours	2
Course Objectives (CO's)		☐ To understand principles and procedures of Environmental Impact Assessment (EIA). ☐ To develop knowledge of biodiversity assessment and ecological survey methods. ☐ To build practical skills for environmental monitoring and biodiversity documentation.			
COURSE CONTENT / SYLLABUS					
UNIT-I		Fundamentals of Environmental Impact Assessment (EIA) 1. Introduction to EIA - Definition, objectives and significance - Scope and need of EIA 2. Environmental Legislation and Policies - EIA Notification and regulatory framework in India - Public participation and environmental clearance - Role of environmental agencies			1 Credit
UNIT-II		EIA Process - Screening and scoping - Baseline environmental data - Impact prediction and assessment - Environmental Management Plan (EMP)			1 Credit
UNIT-III		Environmental Monitoring and Conservation Assessment 1. Environmental Monitoring - Air, water and soil quality assessment - Biological indicators and biomonitoring 2. Biodiversity Documentation - Field data recording and specimen documentation - GIS, GPS and digital tools in biodiversity surveys 3. EIA and Conservation Applications - Biodiversity impact assessment - Case studies of development projects - Conservation planning and mitigation measures			1 Credit
REFERENCES: (Other relavent reading resources can be used)					
1.	P.D. Sharma – Ecology and Environment				
2.	Erach Bharucha – Environmental Studies				



3.	Trivedi P.C. – Biodiversity and Conservation
4.	Canter – Environmental Impact Assessment
5.	Government EIA Guidelines and Biodiversity Assessment Manuals
6.	P.D. Sharma – Ecology and Environment

SEMESTER VII

MAJOR (Instead of OJT)

MJZO -710: Environmental Impact Assessment and Biodiversity Surveys Practical/ Lab course (Credit- 1)

Course Outcome

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

- Explain concepts, stages and significance of Environmental Impact Assessment.
- Apply biodiversity survey and ecological sampling techniques in field studies.
- Interpret environmental and biodiversity data for conservation and management planning.

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -VII	OJT-ZO - 710 (Practical)	Environmental Impact Assessment and Biodiversity Surveys	1	30 hrs	30 (15+15) Marks

1. Preparation and interpretation of environmental and biodiversity survey formats.
2. Quadrat and line transect methods for vegetation and faunal surveys.
3. Calculation of biodiversity indices (species richness, Shannon index, etc.).
4. Use of GPS and map-based biodiversity documentation.
5. Field identification of Birds using binocular and field guide
6. Case study analysis of Environmental Impact Assessment reports.
7. Field visit to natural habitat/protected area and preparation of biodiversity survey report.
8. Other as suggested by teacher

Certified journals at the time of University Practical exams are compulsory.

UNIVERSITY PRACTICAL EXAM PATTERN

There will be a Two Exercise in each practical, as under, total of **15 Marks**.

(1) Practical exercise (10 marks) (2) Viva (3 marks) (3) Practical Journal (2 marks)

Duration of Exam: 2 Hrs.

Examiner will submit marks out of 15 to university.

Passing standard: 6 Marks out of 15 Marks.



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KACHCHH UNIVERSITY: BHUJ
NEP: SEMESTER: VII (SEVEN)
SKILL Based practical for OJT ZOOLOGY

**PAPER NAME: ECOLOGICAL SURVEY TECHNIQUES & RESEARCH METHODS
(PRACTICAL BASED FOR OJT)**

PAPER CODE NO: OJT ZO-711

Marks: External Evaluation: 25, Internal Evaluation: 25. Total Marks 50

Course Outcomes

Upon completion of the course, students will be able to:

Apply ecological sampling and biodiversity survey methods in field studies.

Record, analyze and interpret ecological and biodiversity data.

Prepare ecological survey reports and conservation assessments.

➤ **Field Survey Methods:**

- Quadrat method
- Line and belt transect methods
- Point count and direct observation
- Capture–recapture and indirect evidence methods
- Data entry in data sheets/ excel.
- Survey data interpretation

➤ **Research Methodology**

Web & Tools for Literature Search

- Research Journals & publications
- Citation & Referencing.

Note: Journals are to be signed regularly by the concerned teacher and finally certified before the College Internal test. If a student does not Sign the certified journal at the exam, he/she will not be allowed for the exam.

UNIVERSITY PRACTICAL EXAM PATTERN-SEC

There will be a Four Exercise in each practical, as under, total of **25 Marks**.

(1) Exercise/ Reports (2) Viva

Duration of Exam: 2 Hrs.

Passing standard: 10 Marks out of 25 Marks.



By Pandey

**KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY,
BHUJ.**

Year: 2026-2027



B.Sc (Honours)

ZOOLOGY

(With Research /Without Research)

Semesters : VIII

(Exit option)

**FACULTY OF SCIENCE
SYLLABUS**

MJZO -801: Disease Biology & Toxicology
MJZO-802 : Disease Biology & Toxicology (Practical)
MJZO -803: Occupational Health Hazards and Biosafety
MJZO -804: Occupational Health Hazards and Biosafety (Practical)
MJZO -805: Env. Issues and Marine Environmental Management
MJZO -806: Env. Issues and Marine Env. Management (Practical)
MNZO 807: Parasitology, Genetics and Biostatistics
MNZO 808: Parasitology, Genetics and Biostatistics (Practical)
DSZO 809: Research /Dissertation

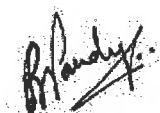
**Curriculum as per UGC Guideline
Framed according to National Education Policy (NEP) - 2020
With effect from June – 2026 (and thereafter)**

B.Sc. (Honours) Zoology Programme



B. Pandey

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: MAJOR					
Year	IV	MJZO-801: Disease Biology & Toxicology		Credit	3
Semester	VIII			Hours	2
Course Objectives (CO's)		To introduce students to various human diseases, including infectious nutritional, lifestyle, and metabolic disorders, along with their causes, effects and prevention. The course also provides a basic understanding of toxicology types of toxins, and their impact on health and the environment.			
COURSE CONTENT / SYLLABUS					
UNIT-I		Diseases • Difference between infectious and non-infectious diseases • Vector borne diseases: vector, host & causes ◦ Malaria, Dengue, Chikungunya, Filariasis (more can be added) ◦ Zoonotics • Nutritional diseases: Malnutrition: Types – undernutrition & over nutrition ◦ Deficiency Diseases: Vitamin A deficiency, Vitamin D deficiency ◦ Iron deficiency, Iodine deficiency			1 Credit
UNIT-II		Diseases biology-II • Lifestyle diseases: Causes, effects, present scenario ◦ Obesity, Hypertension, Cardiovascular diseases, Type 2 Diabetes ◦ Stress-related disorders, ◦ Preventive strategies • Metabolic diseases ◦ Diabetes Mellitus (Type 1 & 2), Hyperthyroidism / Hypothyroidism /Phenylketonuria (PKU), Gout			1 Credit
UNIT-III		Toxicology • Definition of Toxicology, toxicant. Type of toxicity (Acute, sub-acute, chronic), • Type of Toxins: Natural (Animal, plant & Microbial), Synthetic (Pesticides, heavy metals, industrial pollutants, etc) • Factors affecting Toxicity: Size of animal, Age, Sex, Species, Strain, Feed & Feeding, dosage: Entry of toxicants into the			1 Credit




	animal's body: Gastro-intestinal route, Skin, Lungs, Parenteral administration. • Absorption, distribution, metabolism (biotransformation), and excretion of toxins (ADME) • Environmental toxicology: Ecotoxicology & food chain contamination, Case studies (Minamata disease, Bhopal gas tragedy & any other relevant)	
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REFERENCES

1.	B.K. Mahajan & Gupta– Preventive and Social Medicine (Jaypee Brothers)
2.	K. Park – Park's Textbook of Preventive and Social Medicine (Banarsidas Bhanot)
3.	Tortora, Funke, & Case – <i>Microbiology: An Introduction</i>
4.	C.C. Chatterjee – Human Physiology Vol II (Medical Allied Agency)
5.	P.D. Sharma – <i>Environmental Biology & Toxicology (Rastogi Publications)</i>
6.	Environmental Pollution (Popular Science), N. Manivasakan, National Book Trust, New Delhi.

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



R. Pandey

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2026-27 UNDER NEP-2020)
SEMESTER VIII

MAJOR
MJZO-802: Disease Biology & Toxicology
Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand and learn about disease and use in public health and awareness

<i>SEMESTER</i>	<i>COURSE CODE</i>	<i>COURSE TITLE</i>	<i>PRACTICAL</i>		
			<i>Credits</i>	<i>Hours</i>	<i>Total (Internal + External)</i>
B.Sc -VIII	MJZO-802	Disease Biology & Toxicology	1	30 hrs	30 (15+15) Marks

Practical-1:	To study various causative of vector borne diseases (Anopheles mosquito, Culex, Aedes mosquito, Tick, mite, filarial worm, sand fly, rat flea..etc.)
Practical -2:	Study life cycle and stages of Plasmodium, filaria worm, mouth parts of different causatives.
Practical-3	To study BMI ratio and relating with health
Practical -4:	To study Anthropometry- skinfold thickness & waist to hip ratio
Practical -5:	To monitor heart rate and blood pressure pre and post exercise
Practical -6:	Study of blood glucose level
Practical -7:	Survey Activity: Lifestyle Habits and Risk Factors (Sleep pattern, screen time, activity time, etc.)
Practical – 8:	Prepare case studies on Toxicological accidents
Practical-9:	Public health activity



B. Pandey

SEMESTER - VIII

MJZO-802: Disease Biology & Toxicology

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

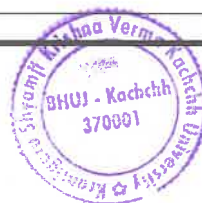
Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Self health assessment: Blood pressure/heart rate/BMI	03
Exercise 2. From Practical 2	03
Exercise 3. Do as directed	05
Exercise 4. Journal & Viva	04
TOTAL	15

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



Mandya

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: MAJOR					
Year	IV	MJZO-803: Occupational Health Hazards and Biosafety		Credit	3
Semester	VIII			Hours	2
Course Objectives (CO's)		☐ To understand occupational health hazards associated with biological and environmental exposure. ☐ To develop awareness regarding zoonotic diseases, laboratory hazards and workplace safety. ☐ To familiarize students with biosafety measures and occupational health management.			
COURSE CONTENT / SYLLABUS					
UNIT-I		Fundamentals of Occupational Health and Biological Hazards ☐ Introduction to Occupational Health • Definition, scope and importance • Occupational health in biological sciences ☐ Types of Occupational Hazards • Physical hazards (heat, radiation, noise) • Chemical hazards and toxic exposure • Biological hazards and bioaerosols ☐ Occupational Diseases • Allergies and respiratory disorders • Toxicity and poisoning • Occupational stress and ergonomic problems			1 Credit
UNIT-II		Zoonoses and Occupational Risks in Zoology • Zoonotic Diseases ○ Definition and transmission pathways ○ Rabies, leptospirosis, avian influenza ○ Vector-borne and emerging zoonoses • Occupational Risks in Zoological Work ○ Laboratory animal handling ○ Wildlife and veterinary exposure ○ Field survey and specimen handling hazards • Prevention and Health Protection ○ Vaccination and personal hygiene ○ Exposure prevention and disease control			1 Credit
UNIT-III		Biosafety and Occupational Health Management • Biosafety Principles ○ Biosafety levels and containment ○ Laboratory safety guidelines • Safety Practices and Waste Management ○ Personal Protective Equipment (PPE) ○ Biomedical and laboratory waste disposal ○ First aid and emergency response • Occupational Health Management			1 Credit

	○ Risk assessment and safety audit ○ Health monitoring and biosafety regulations ○ Ethical and safety practices in laboratories and field work	
REFERENCES		
1.	B.K. Mahajan & Gupta– Preventive and Social Medicine (Jaypee Brothers)	
2.	K. Park – Park’s Textbook of Preventive and Social Medicine (Banarsidas Bhanot)	
3.	Tortora, Funke, & Case – <i>Microbiology: An Introduction</i>	
4.	C.C. Chatterjee – Human Physiology Vol II (Medical Allied Agency)	
5.	P.D. Sharma – <i>Environmental Biology & Toxicology</i> (Rastogi Publications)	
6.	Environmental Pollution (Popular Science), N. Manivasakan, National Book Trust, New Delhi.	

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



B. Pandey

KSKV Kachchh University, Bhuj - Kachchh
(Effective from June 2026-27 UNDER NEP-2020)
SEMESTER VIII

MAJOR
MJZO-804: Occupational Health Hazards and Biosafety
Practical/ Lab course (Credit- 1)

Course Outcome

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

1. Understand and learn about disease and use in public health and awareness

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -VIII	MJZO-804	Occupational Health Hazards and Biosafety	1	30 hrs	30 (15+15) Marks

Practical-1:	To study various causative of vector borne diseases (Anopheles mosquito, Culex, Aedes mosquito, Tick, mite, filarial worm, sand fly, rat flea..etc.)
Practical -2:	Study life cycle and stages of Plasmodium, filaria worm, mouth parts of different causatives.
Practical-3	To study BMI ratio and relating with health
Practical -4:	To study Anthropometry- skinfold thickness & waist to hip ratio
Practical -5:	To monitor heart rate and blood pressure pre and post exercise
Practical -6:	Study of blood glucose level
Practical -7:	Survey Activity: Lifestyle Habits and Risk Factors (Sleep pattern, screen time, activity time, etc.)
Practical – 8:	Prepare case studies on Toxicological accidents
Practical-9:	Public health activity

MJZO-804: Occupational Health Hazards and Biosafety

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Self health assessment: Blood pressure/heart rate/BMI	03
Exercise 2. From Practical 2	03
Exercise 3. Do as directed	05
Exercise 4. Journal & Viva	04
TOTAL	15

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

		KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: MAJOR					
Year	IV	MJZO-805: Environmental Issues and Marine Environmental Management		Credit	3
Semester	VIII			Hours	2
Course Objectives (CO's)		☐ To understand contemporary environmental challenges and their ecological implications. ☐ To develop knowledge of climate change, marine and coastal management, and pollution issues. ☐ To familiarize students with environmental management and sustainable mitigation approaches.			
COURSE CONTENT / SYLLABUS					
UNIT-I		Emerging Environmental Concerns - Habitat degradation and fragmentation - Land-use and land-cover change - Desertification and biodiversity loss - Invasive alien species and ecosystem disturbances - Environmental displacement and ecological resilience			1 Credit
UNIT-II		Marine and Coastal Ecosystems Marine biodiversity : Overview, significance Marine and Coastal Environmental Problems: Coastal erosion and shoreline modification, Coral bleaching and reef degradation, Mangrove destruction and habitat loss, Marine pollution and eutrophication, Oil spills and chemical contamination, Marine litter and microplastics, Overfishing and depletion of marine resources.			1 Credit
UNIT-III		Integrated Coastal and Marine Management - Integrated Coastal Zone Management (ICZM) - Coastal resource management and sustainable fisheries - Community participation in coastal conservation Sustainable Environmental Management - Plastic pollution and waste management in coastal areas - Restoration of mangroves and marine habitats - Environmental monitoring and impact assessment - Blue economy concepts - Marine Ecosystem and SDG goals.			1 Credit
 REFERENCES					

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1.	P.D. Sharma – Ecology and Environment
2.	Erach Bharucha – Environmental Studies
3.	Cunningham – Environmental Science
4.	Rajagopalan – Environmental Studies
5.	UNEP and Government Environmental Management Reports
6.	Marine Biology by Levinton
7.	ICZM guidelines
8	Marine Biology by Castro

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



B. Pandey

SEMESTER VIII

MAJOR

MJZO-806: Environmental Issues and Marine Environmental Management

Practical/ Lab course (Credit- 1)

Course Outcome

Upon completion of the course, students will be able to:

1. Explain major contemporary environmental issues and their ecological impacts.
2. Assess climate change, pollution and coastal management challenges.
3. Apply environmental management concepts and sustainable practices.

SEMESTER	COURSE CODE	COURSE TITLE	PRACTICAL		
			Credits	Hours	Total (Internal + External)
B.Sc -VIII	MJZO-806	Environmental Issues and Marine Environmental Management	1	30 hrs	30 (15+15) Marks

Practical-1:	Mapping and case study analysis of coastal or environmental issues.
Practical -2:	Study selected invasive species in terrestrial environment with impacts
Practical-3	To study selected invasive species in marine environment with impacts
Practical -4:	Study and interpretation of climate data (temperature, rainfall, sea level or extreme weather records) using secondary datasets.
Practical -5:	Assessment of local environmental problems and preparation of environmental issue documentation.
Practical -6:	Mapping and interpretation of Coastal Regulation Zone (CRZ) and Exclusive Economic Zone (EEZ) using maps/GIS-based resources.
Practical -7:	Case studies of oil spills
Practical – 8:	Preparation of environmental management or coastal conservation plans through group exercises/case studies.
Practical-9:	Field visit to coastal ecosystem/wetland/waste management facility or environmentally impacted area and submission of field report. (Self study)



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SEMESTER - VIII

**MJZO-806: Environmental Issues and Marine Environmental
Management**

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 15 Marks

B. Sc.: SKELETAL STRUCTURE OF UNIVERSITY PRACTICAL

Instructions: Strictly follow the instructions given by examiner(s).	Marks
Exercise 1: Exercise 2. Exercise 3.	11 Marks
Exercise 4. Journal & Viva	04
TOTAL	15

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



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	KSKV Kachchh University Bhuj - 370001		ACADEMIC YEAR 2026-27	
Bachelor of Science: (MINOR)				
Year	IV	MNZO-807: Parasitology, Genetics and Biostatistics	Credit	3
Semester	VIII		Hours	2
OBJECTIVE S:		☐ To understand basic concepts of human parasitology and host–parasite interactions. ☐ To explain principles of inheritance, linkage and crossing over in genetics. ☐ To develop skills in biostatistics, data collection and graphical analysis for biological studies.		
COURSE CONTENT / SYLLABUS				
UNIT-I	HUMAN PARASITOLOGY 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)			1
UNIT-II	GENETICS 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			1
UNIT-III	BASIC BIOSTATISTICS 1. Importance of Biostatistics in biological studies 2. Mean, Median, Mode, Range 3. Standard deviation 4. 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			1
REFERENCES				

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1.	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 VIII: MINOR
MNZO-807 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 - VIII	MJZO804	Parasitology, Genetics and Biostatistics	1	30 hrs	30 (15+15) Marks

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

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: 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
SEMESTER-VIII: (MINOR)

MNZO-808 -Parasitology, Genetics and Biostatistics

INTERNAL EVALUATION: 15 Marks

EXTERNAL EVALUATION: 15 Marks

Total Marks: 10

Instructions: Strictly follow the instructions given by examiner(s).		Marks
Exercise 1: Draw/Demonstrate & explain the lifecycle of _____.		03
Exercise 2. Do as directed: Genetics problem as asked		02
Exercise 3. Identify and describe as per given instructions (1.5 marks each)		06
Identify and describe Identify and describe Identify and describe		
Exercise 4. a. <i>Journal and Viva</i>		04
TOTAL		15

PAPER 809: Dissertation (for student with research option)

OJT (for students without research)

Internal : 75 Marks

External : 75 Marks

Evaluation will be based on (Report + Viva)


DEAN
FACULTY OF SCIENCE
KSKV KACHCHH UNIVERSITY
BHUJ-KACHCHH-370001


(Dr. Pranav J. Pandya)
Chairman,
Board of Studies, Zoology



