



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો લાઇફ-સાયન્સ વિષય (બી.એસ.સી ઝૂલોજી વિથ ઓનર્સ) સેમેસ્ટર-૧ના અભ્યાસક્રમમાં રિવાઈઝડ પેપર સ્ટાઈલ (SOP, શિક્ષણ વિભાગ, ગુજરાત સરકાર ની ગાઈડલાઈન્સ પ્રમાણે) જેની સાથેનો ૨૦૨૩-૨૪નો અભ્યાસક્રમ આ સાથે સામેલ છે. જે આપને વિદિત થાય.

માનનીય કુલપતિશ્રીની મંજૂરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન, ૨૦૨૩ થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો ધ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.



[Signature]
76/10/2024

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/ એકેડેમિક/૧૩૯૧/૨૦૨૪

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,

સરકારી પોલીટેકનિક કેમ્પસ,

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,

ખડીયા, જૂનાગઢ-૩૬૨૨૬૩

તા.૧૬/૧૦/૨૦૨૪

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જુનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઈ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)



**BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH**



BOARD OF LIFE-SCIENCE STUDIES

FACULTY OF SCIENCE

SYLLABUS FOR

B.Sc. (ZOOLOGY) (HONOURS)

PROGRAMME

(SEMESTER- I)

EFFECTIVE FROM JUNE, 2023

FORWARD

In academics, syllabus serves as a roadmap for teaching various topics in a well-defined manner. Along with constant changes in the field of subject, it is always required to review and update the syllabus so as to meet changing scenario at regional, national and global levels. In science, higher education at degree level creates base for students to sharpen their skills and enable them for securing employment. Moreover, for a few this also opens a new realm of research and education at post-graduation level. Hence, finalizing degree level syllabus requires to keep all these facts in mind.

The NEP 2020 states, “Assessments of educational approaches in undergraduate education that integrate the humanities and arts with Science, Technology, Engineering and Mathematics (STEM) have consistently shown positive learning outcomes, including increased creativity and innovation, critical thinking and higher-order thinking capacities, problem-solving abilities, teamwork, communication skills, more in-depth learning and mastery of curricula across fields, increases in social and moral awareness, etc., besides general engagement and enjoyment of learning”.

Here, the current syllabus is finalized after elaborate discussions amongst well qualified and experienced teachers. The syllabus is prepared according to the guidelines of UGC under NEP 2020. We delighted to share the curriculum and credit framework for B.Sc. Zoology Sem-1 and Sem-2. The present syllabus encompasses latest trends in the subject. We are hopeful that students will be able to enhance their knowledge and understating of the subject well.

INDEX

No.	Content	
1	Guidelines and Pattern of Examination for Semester-I and Semester-II	
2	Credit Summary	
3	Programme Outcomes Zoology	
4	Credit Structure for Semester-I and Semester-II	
5	Course structure and syllabus Semester-I	
SEMESTER-I	Major-1	Course details, objectives and outcomes
		DSC-101 (Theory)
		DSC-101P (Practical)
		Reference Books and Paper style
	Major-2	Course details, objectives and outcomes
		DSC-102 (Theory)
		DSC-102P (Practical)
		Reference Books and Paper style
	Minor-1	Course details, objectives and outcomes
		DSM-101 (Theory)
		DSM-101P (Practical)
		Reference Books and Paper style
	Multidisciplinary Course	Course details, objectives and outcomes
		MDC-101 (Theory)
		MDC-101P (Practical)
		Reference Books and Paper style
	Skill Enhancement Course	Course details, objectives and outcomes
		SEC-101
		Reference Books and Paper style

Syllabus of B.Sc. Zoology Sem-1 as per NEP 2020 guidelines

The syllabus of B.Sc. Zoology Sem-1 & 2 has been prepared as per the guidelines of NEP 2020 and Bhakta Kavi Narsinh Mehta University, Junagadh.

As explained in NEP 2020, “the undergraduate degree will be of either 3 or 4-year duration, with multiple exit options within this period, with appropriate certifications, e.g., a UG certificate after completing 1 year in a discipline or field including vocational and professional areas, or a UG diploma after 2 years of study, or a Bachelor’s degree after a 3-year programme. The 4-year multidisciplinary Bachelor's programme, however, shall be the preferred option since it allows the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student”.

Pattern of Examination for Semester-I

EVALUATION OF 100 MARKS (4 CREDIT PAPER)

Continuous and Comprehensive Evaluation (CCE)- Formative-50 Marks		Semester End Evaluation (SEE)-Summative-50 Marks
Theory (25 Marks)	Practical (25 Marks)	1. Writing and Memory skill test
1. Test 15 Marks	1. Performance 15 Marks	
2. Assignment 05 Marks	2. Viva 10 Marks	
3. Attendance 05 Marks		
Total 25 Marks	Total 25 Marks	Total 50 Marks

Marks of practical and viva will be considered under CCE.

Credit Summary

S.N.	Type of Course	3 years	4 Years Honours	4 Years Honours with Research
1	Major: Discipline Specific Core Course	64	88	88
2	Minor: Discipline Specific minor Course	24	32	32
3	Multidisciplinary course/ Interdisciplinary	12	12	12
4	Ability Enhancement Course (AEC)	10	10	10
5	Skill Enhancement Course (SEC)/Internship	14	14	14
6	Value Added Course (VAC)	08	08	08
7	On job training/internship	--	12	--
8	Research Project/dissertation	--	--	12
	Total	132	176	176

Zoology Program Outcomes Objectives:

- The programme in Zoology aims to equip students with recent advances in Zoology from organismic to reductionist biology.
- It also aims to empower students to understand the challenges of society and the country that falls into the realms of Zoology, such as Aquaculture, environment and health, animal behaviour, wildlife conservation, etc.
- It also offers students to a series of multidisciplinary and skill-based courses so that they can choose to specialize in the specific area of their interests in Zoology.
- The open elective has been chosen to attract students from diverse interdisciplinary areas of sciences, such as fisheries, Environmental studies, Economic zoology, etc.
- This course is designed to ignite the inquisitive mind to enter into research in interdisciplinary areas.
- It is expected that a student after successfully completing the programme would sufficiently be skilled and empowered to solve the problems in the realms of Zoology and its allied areas.
- They would have plethora of job opportunities in the education, environment, agriculture based, and wildlife related sectors.
- The bright and ignited mind may enter research in the contemporary areas of Zoological/Biological Sciences.

Program Specific Outcomes:

- Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, biochemistry, ecology, evolutionary biology, developmental biology and applied and economic zoology.
- Analyse the relationships among animals, plants, and microbes.
- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, tools and techniques of Zoology, Toxicology, Entomology, Nematology, Sericulture, Biochemistry, Fish biology, Animal biotechnology.
- Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm, wildlife conservation.
- Gains knowledge about effective communication and skills of problem-solving methods.
- Contributes the knowledge for Nation building.

SUBJECT: ZOOLOGY (MAJOR, MINOR, MDC/IDC & SEC)

FACULTY: SCIENCE

CREDIT STRUCTURE

Semester-I							
No.	Core/Elective/ Ict.	Name of Course	Credits	CCE	SEE	Total	Course/ paper Code
1	MAJOR	Non-Chordates-I and wildlife	03	25	50	75	DSC-101
	MAJOR (Practical)	Non-Chordates-I and wildlife	01	25	00	25	DSC-101P
2	MAJOR	Fundamentals of Zoology-1	03	25	50	75	DSC-102
	MAJOR (Practical)	Fundamentals of Zoology-1	01	25	00	25	DSC-102P
3	MINOR	Non-Chordates-I and wildlife	03	25	50	75	DSM-101
	MINOR (Practical)	Non-Chordates-I and wildlife	01	25	00	25	DSM-101P
4	Multidisciplinary Course	Fundamentals of Zoology-1	03	25	50	75	MDC-101
	Multidisciplinary Course (Practical)	Fundamentals of Zoology-1	01	25	00	25	MDC-101P
5	Skill Enhancement Course (Practical)	Apiculture	02	25	25	50	SEC-101
Total			18			450	

CCE - Continuous and Comprehensive Evaluation

SEE - Semester End Evaluation (SEE)

Zoology Sem-I Discipline Specific Core Courses (Major-1)

Course Level	UG	Teaching Hours	45 + 30 = 75
Programme	Zoology	CCE (Theory)	25
Semester	I	CCE (Practical)	25
Course Type	Discipline Specific Core Courses (Major-1)	SEE	50
Course title	NON-CHORDATES-I and WILDLIFE	Total	100
Credit	03 + 01 (Practical) = 04	Exam Duration	2:00 Hrs.
Course Code	DSC-101 DSC-101P (Practical)	Practical Exam Duration	2:00 Hrs.

COURSE OBJECTIVES:

- The course would provide an insight to the learner about the existence of different lifeforms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities.
- The course will also make the students aware about wild and domestic animals; difference between national parks and sanctuaries; population and conservation status of wildlife according to IUCN; and will create interest among them to explore the animal diversity in nature.

COURSE OUTCOMES:

- Upon completion of the course, students should be able to:
- Learn about the importance of systematics, taxonomy and structural organization of animals. Appreciate the diversity of protozoans living in varied habit and habitats. Critically analyze the organization, culture, life cycle and pathogenicity of Amoeba and Entamoeba making them familiarize with diseases spread by them.
- Learn about the importance of systematics, taxonomy and structural organization of sponges, canal system and spicules in sponges.
- Learn about the importance of systematics, taxonomy and structural organization of cnidarian animals, Polymorphism in cnidaria and study of Obelia (Sea-Fur) as type animal.
- Able to differentiate between wild life and domesticated animals with understanding of importance of Natural vegetation and wildlife. Familiarize with the conservation methods and appraise the efforts made by the government for their conservation. Learn more about status of some representatives of wildlife, their habitats, threats, etc. along-with different conservation projects, sanctuaries and national parks.

NON-CHORDATES-I and WILDLIFE

COURSE CONTENT		
Units	Title of the Unit and the Topics	No. of Lectures
Unit 1	Protozoa 1.1 General characteristic and classification up to class 1.2 Study of Amoeba proteus: systematic position, habit and habitat, culture, structure, locomotion, nutrition, respiration, excretion, osmoregulation, behaviour, reproduction and biological significance	12
Unit 2	Porifera 2.1 General characteristics and classification up to class 2.2 Canal system in sponges 2.3 Spicules in sponge.	10
Unit 3	Cnidaria 3.1 General characteristics and classification up to class 3.2 Polymorphism in cnidaria 3.3 Study of Obelia (Sea-Fur): Systematic position, habit and habitat, hydroid colony (morphology and histology, asexual reproduction), medusa stage (Development of medusa, morphology and histology, sexual reproduction), alternation of generation and metagenesis	12
Unit 4	Wildlife 4.1 Introduction & Importance of Wildlife 4.2 Difference between National Parks & Sanctuaries 4.3 Wildlife in Gujarat: NATIONAL PARKS: (i) Gir Forest National Park (ii) Marine National Park in Gulf of Kutch SANCTUARIES: (i) Kutch desert wildlife sanctuary, (ii) Barda wildlife sanctuary (iii) Nalsarovar bird sanctuary (iv) Khijadia bird sanctuary	11

NON-CHORDATES-I and WILDLIFE**Based on ZOOLOGY DSC-101**

Practical 1	Identification and classification of Invertebrate animals-1: Phylum: Protozoa: - Arcella, Ceratium, Vorticella, Plasmodium
Practical 2	Identification and classification of Invertebrate animals-2: Phylum: Porifera: - Leucosolenia, Grantia, Euplectella, Hyalonema, Euspongia, Chalina
Practical 3	Identification and classification of Invertebrate animals-3: Phylum: Cnidaria:- Hydra, Porpita, Physalia, Aurelia, Rhizoastoma, Metridium, Pennatula, Gorgonia
Practical 4	Study of <i>Amoeba proteus</i> : structure, locomotion, nutrition, reproduction
Practical 5	Examination of pond water collected from different places for diversity in protozoa
Practical 6	Study of spicules in porifera
Practical 7	To study polymorphism in cnidaria
Practical 8	To study coral/ coral reefs.
Practical 9	National Park & Sanctuary (as per theory syllabus) spotting in map of Gujarat.
Practical 10	Study of following wild animals-1. Asiatic Lion, Leopard, Hyena, Chinkara, Spotted deer, Wild Ass by photograph, Chart, stuffed animals or multimedia
Practical 11	Study of following wild animals-2. Caracal, Dugong, Dolphin, Greater flamingo, Painted stork, Uromastyx by photograph, Chart, stuffed animals or multimedia
Practical 12	To study IUCN Red data list categories with example [Extinct-Pink Headed Duck, Critically Endangered-Great Indian Bustard, Endangered-Tiger, Vulnerable-Snow Leopard, Least concerned-Indian Peafowl]
Practical 13	To submit any chart/model according to syllabus.

REFERENCE BOOKS:

1. Invertebrate Zoology.....E. L. Jordan & Dr. P. S. Verma
2. Invertebrate Zoology.....P. S. Dhami & J. K. Dhami
3. A modern textbook of Zoology Invertebrate Zoology.....R. L. Kotpal
4. A textbook of Practical Zoology Invertebrates.....S. S. Lal
5. A Manual of Practical Zoology, Invertebrates.....P. S. Verma
6. Wild Life of Gujarat.....H. S. Singh
7. Indian National Parks and Sanctuaries.....Khati & Annand S

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH**Theory Examination Paper Style NEP 2020****SEMESTER – I**

EXTERNAL ASSESSMENT BY UNIVERSITY			50
Marks			
Que. No.	Particulars	Unit	Marks
Que-1	Question (1) (2)	1	05 05
	OR		
	Question (1) (2)		05 05
Que-2	Question (1) (2)	2	05 05
	OR		
	Question (1) (2)		05 05
Que-3	Question (1) (2)	3	05 05
	OR		
	Question (1) (2)		05 05
Que-4	Question (1) (2)	4	05 05
	OR		
	Question (1) (2)		05 05
Que-5	Question (1) (2)	1 & 2	05 05
	OR		
	Question (1) (2)	3 & 4	05 05

PRACTICAL EXAMINATION

SEMESTER – I

Time: 3 Hours

Total Marks: 25

Que. No.	Particulars	Marks
Que-1	Sketch and label _____ of <i>Amoeba proteus</i> . (Practical-4)	02
Que-2	Prepare temporary slide as per instruction and show it to examiner. (Practical-5)	02
Que-3	Do as per instruction and show it to examiner. (Practical-9/12)	02
Que-4	Write as per instruction. A. Identify and classify giving reasons (Practical-1/2) B. Identify and classify giving reasons (Practical-3) C. Identify and describe (Practical-6/7/8) D. Identify and describe (Practical-10/11)	08
Que-5	Certified Journal.	01
Que-6	Viva-voice.	10

Zoology Sem-I Discipline Specific Core Courses (Major-2)

Course Level	UG	Teaching Hours	45 + 30 = 75
Programme	Zoology	CCE (Theory)	25
Semester	I	CCE (Practical)	25
Course Type	Discipline Specific Core Courses (Major-2)	SEE	50
Course title	FUNDAMENTALS OF ZOOLOGY-1	Total	100
Credit	03 + 01 (Practical) = 04	Exam Duration	2:00 Hrs.
Course Code	DSC-102 DSC-102P (Practical)	Practical Exam Duration	2:00 Hrs.

Course Objectives:

- The focus of Cell Biology is the study of the structure and function of the cell. This course will focus on discovery and history of cell theory, basics of cell structure and cell communication.
- The students will be introduced to the principles of normal biological function in human body. Basic human physiology will be outlined and correlated with histological structures. Students will be exposed to the concept of how animals digest food and assimilate it. They also learn the physiology of how blood coagulate.
- The course also aims to provide an overview of genetics from the concept of gene to multiple alleles and its examples. The course will help in building sound fundamental knowledge of the principles of genetics, to be used as a stepping stone for higher studies and research in this field.

Course Learning Outcomes:

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

- Learn about the Cell discovery and cell theory, differences between Prokaryotic and Eukaryotic animal cells, structure of few cell organelles and types of Cell junctions.
- Know the principles of normal biological function in human body. Outline basic human physiology and correlate with histological structures. Understand how animals get nutrients and survive when injured in response to blood loss.
- Students will understand the reproductive organs and its functions in human and animals.
- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors. Understand ecosystem, types, their food chains and food webs. Apply the basic principles of ecology in wildlife conservation and management.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

FUNDAMENTALS OF ZOOLOGY-1

COURSE CONTENTS		
Units	Title of the Unit and the Topics	No. of Lectures
Unit 1	Cell Biology 1.1 Cell discovery and cell theory (Robert Hook and Theodor Shwann), Prokaryotic and Eukaryotic animal cells 1.2 Cell organelles: (i) Lysosomes (ii) Golgi apparatus (iii) Centrioles and basal bodies (iv) Plasma membrane 1.3 Cell junctions: Tight junctions, Desmosomes, Gap junctions	12
Unit 2	Histology 2.1 Introduction of Histology, histological structure of the mammalian tissues: Squamous epithelium, Cuboidal epithelium, Columnar epithelium, Ciliated epithelium, Stratified epithelium, Areolar connective tissues, Bone, Cartilage connective tissue 2.2 Histological structure and function of following organs of Mammals (i) Stomach (ii) Intestine (Duodenum and Ileum) (iii) Liver (iv) Pancreas	12
Unit 3	Physiology 3.1 DIGESTION: (i) Physiology of ingestion, digestion and absorption of carbohydrates, proteins, lipids, nucleic acids in alimentary canal 3.2 BLOOD: (i) Composition of blood. (ii) Physiology of coagulation of blood	10
Unit 4	Genetics 4.1 Concept of Gene (Cistron, Recon, Muton, Jumping genes) 4.2 Multiple Alleles: (i) Characters of multiple alleles. (ii) The 'C' gene in Rabbit (Coat colour). (iii) A, B, AB & O blood groups in Humans. (iv) 'Rh' factor & Erythroblastosis foetalis.	11

FUNDAMENTALS OF ZOOLOGY-1

Based on ZOOLOGY DSC-102

Practical 1	Study of compound microscope.
Practical 2	To study typical Eukaryotic Cell (Onion cell/Human Cheek cell).
Practical 3	To study cell organelles with the help of permanent slides/charts/models (i) Lysosomes (ii) Golgi apparatus (iii) Centrioles and basal bodies (iv) Plasma membrane
Practical 4	To study Cell junctions: Tight junctions, Desmosomes, Gap junctions with the help of permanent slides/charts/models
Practical 5	To study histological structure of the mammalian tissues with the help of permanent slides/charts/models: Squamous epithelium, Cuboidal epithelium, Columnar epithelium, Ciliated epithelium, Stratified epithelium, Areolar connective tissues, Bone, Cartilage connective tissue
Practical 6	To study histological structure and function of following organs of Mammals (i) Stomach (ii) Intestine (Duodenum and Ileum) (iii) Liver (iv) Pancreas
Practical 7	Action of human salivary Amylase (ptyalin) on Starch.
Practical 8	To determine own blood group and Rh factor.
Practical 9	To study molecular structure of nitrogen bases (Through chart/model)
Practical 10	To study molecular structure of nucleoside, nucleotide, di-nucleotide and polynucleotide (Through chart/model)
Practical 11	Examples of Multiple Alleles : 1. The 'C' gene in Rabbit (Coat colour)- any four examples 2. A, B, AB and O blood groups in Humans-any four examples
Practical 12	To submit any chart/model/histological slides according to syllabus.

Reference Book for Zoology Discipline Specific Core Courses (Major-2)

1. Cell Biology.....Dr. Satyeshchandra Roy
2. Cytology & Genetics.....P. K. Gupta
3. Cell & Molecular Biology.....De Robertis
4. Biotechnological Cell Biology.....V. B. Rastogi
5. Molecular Biology.....V. B. Rastogi
6. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology.....
.....P. S. Varma & V. K. Agrawal
7. Cytology, Genetics & Evolution.....P. K. Gupta
8. Animal physiology.....Eckert
9. Essential of animal physiology.....S. C. Rastogi
10. Element of animal physiology.....R. Nagabhushanam
11. Human physiology.....C. C. Chatterjee
12. Principal of animal physiology.....Wood D. W.
13. Physiology of anatomy and physiology.....Tortora & Tortora
14. Text book of Baley's Histology.....Copenharver bunga & burge
15. A text-book of the principles of animal histology..... Ulrie Dahlgren

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH**Theory Examination Paper Style NEP 2020****SEMESTER – I**

EXTERNAL ASSESSMENT BY UNIVERSITY			50
Marks			
Que. No.	Particulars	Unit	Marks
Que-1	Question (1) (2)	1	05 05
	OR		
	Question (1) (2)		05 05
Que-2	Question (1) (2)	2	05 05
	OR		
	Question (1) (2)		05 05
Que-3	Question (1) (2)	3	05 05
	OR		
	Question (1) (2)		05 05
Que-4	Question (1) (2)	4	05 05
	OR		
	Question (1) (2)		05 05
Que-5	Question (1) (2)	1 & 2	05 05
	OR		
	Question (1) (2)	3 & 4	05 05

PRACTICAL EXAMINATION

SEMESTER – I

Time: 3 Hours

Total Marks: 25

Que. No.	Particulars	Marks
Que-1	Solve the examples of multiple allele. Each from Coat colour and blood group. (Practical-12 and 13).	02
Que-2	Do as per instruction and show it to examiner. (Practical-7/8).	02
Que-3	Do as per instruction and show it to examiner. (Practical-2).	02
Que-4	Write as per instruction. (A) Identify and describe (Practical-3/4) (B) Identify and describe (Practical-5) (C) Identify and describe (Practical-6) (D) Identify and describe (Practical-1/10)	08
Que-5	Certified Journal.	01
Que-6	Viva-voice.	10

Zoology Sem-I Discipline Specific Minor Courses (Minor-1)

Course Level	UG	Teaching Hours	45 + 30 = 75
Programme	Zoology	CCE (Theory)	25
Semester	I	CCE (Practical)	25
Course Type	Discipline Specific Minor Courses (Minor-1)	SEE	50
Course title	NON-CHORDATES-I and WILDLIFE	Total	100
Credit	03 + 01 (Practical) = 04	Exam Duration	2:00 Hrs.
Course Code	DSM-101 DSM-101P (Practical)	Practical Exam Duration	2:00 Hrs.

COURSE OBJECTIVES:

- The course would provide an insight to the learner about the existence of different lifeforms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities.
- The course will also make the students aware about wild and domestic animals; difference between national parks and sanctuaries; population and conservation status of wildlife according to IUCN; and will create interest among them to explore the animal diversity in nature.

COURSE OUTCOMES:

- Upon completion of the course, students should be able to:
- Learn about the importance of systematics, taxonomy and structural organization of animals. Appreciate the diversity of protozoans living in varied habit and habitats. Critically analyse the organization, culture, life cycle and pathogenicity of Amoeba and Entamoeba making them familiarize with diseases spread by them.
- Learn about the importance of systematics, taxonomy and structural organization of sponges, canal system and spicules in sponges.
- Learn about the importance of systematics, taxonomy and structural organization of cnidarian animals, Polymorphism in cnidaria and study of Obelia (Sea-Fur) as type animal.
- Able to differentiate between wildlife and domesticated animals with understanding of importance of Natural vegetation and wildlife. Familiarize with the conservation methods and appraise the efforts made by the government for their conservation. Learn more about status of some representatives of wildlife, their habitats, threats, etc. along-with different conservation projects, sanctuaries and national parks.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

NON CHORDATES-I and WILD LIFE

COURSE CONTENT		
Units	Title of the Unit and the Topics	No. of Lectures
Unit 1	Protozoa 1.1 General characteristic and classification up to class 1.2 Study of Amoeba proteus: systematic position, habit and habitat, culture, structure, locomotion, nutrition, respiration, excretion, osmoregulation, behaviour, reproduction and biological significance	12
Unit 2	Porifera 2.1 General characteristics and classification up to class 2.2 Canal system in sponges 2.3 Spicules in sponge.	10
Unit 3	Cnidaria 3.1 General characteristics and classification up to class 3.2 Polymorphism in cnidaria 3.3 Study of Obelia (Sea-Fur): Systematic position, habit and habitat, hydroid colony (morphology and histology, asexual reproduction), medusa stage (Development of medusa, morphology and histology, sexual reproduction), alternation of generation and metagenesis	12
Unit 4	Wildlife 4.1 Introduction & Importance of Wildlife 4.2 Difference between National Parks & Sanctuaries 4.3 Wildlife in Gujarat: NATIONAL PARKS: (i) Gir Forest National Park (ii) Marine National Park in Gulf of Kutch SANCTUARIES: (i) Kutch desert wildlife sanctuary, (ii) Barda wildlife sanctuary (iii) Nalsarovar bird sanctuary (iv) Khijadia bird sanctuary	11

NON CHORDATES-I and WILD LIFE**Based on ZOOLOGY DSM-101**

Practical 1	Identification and classification of Invertebrate animals-1: Phylum: Protozoa: - Arcella, Ceratium, Vorticella, Plasmodium
Practical 2	Identification and classification of Invertebrate animals-2: Phylum: Porifera: - Leucosolenia, Grantia, Euplectella, Hyalonema, Euspongia, Chalina
Practical 3	Identification and classification of Invertebrate animals-3: Phylum: Cnidaria:- Hydra, Porpita, Physalia, Aurelia, Rhizoastoma, Metridium, Pennatula , Gorgonia
Practical 4	Study of <i>Amoeba proteus</i> : structure, locomotion, nutrition, reproduction
Practical 5	Examination of pond water collected from different places for diversity in protozoa
Practical 6	Study of spicules in porifera
Practical 7	To study polymorphism in cnidaria
Practical 8	To study coral/ coral reefs.
Practical 9	National Park & Sanctuary (as per theory syllabus) spotting in map of Gujarat.
Practical 10	Study of following wild animals-1. Asiatic Lion, Leopard, Hyena, Chinkara, Spotted deer, Wild Ass by photograph, Chart, stuffed animals or multimedia
Practical 11	Study of following wild animals-2. Caracal, Dugong, Dolphin, Greater flamingo, Painted stork, Uromastyx by photograph, Chart, stuffed animals or multimedia
Practical 12	To study IUCN Red data list categories with example [Extinct-Pink Headed Duck, Critically Endangered-Great Indian Bustard, Endangered-Tiger, Vulnerable-Snow Leopard, Least concerned-Indian Peafowl]
Practical 13	To submit any chart/model according to syllabus.

REFERENCE BOOKS:

1. Invertebrate Zoology.....E. L. Jordan & Dr. P. S. Verma
2. Invertebrate Zoology.....P. S. Dhami & J. K. Dhami
3. A modern textbook of Zoology Invertebrate Zoology.....R. L. Kotpal
4. A textbook of Practical Zoology Invertebrates.....S. S. Lal
5. A Manual of Practical Zoology, Invertebrates.....P. S. Verma
6. Wild Life of Gujarat.....H. S. Singh
7. Indian National Parks and Sanctuaries.....Khati & Annand S

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EXTERNAL ASSESSMENT BY UNIVERSITY			50
Marks			
Que. No.	Particulars	Unit	Marks
Que-1	Question (1) (2)	1	05 05
	OR		
	Question (1) (2)		05 05
Que-2	Question (1) (2)	2	05 05
	OR		
	Question (1) (2)		05 05
Que-3	Question (1) (2)	3	05 05
	OR		
	Question (1) (2)		05 05
Que-4	Question (1) (2)	4	05 05
	OR		
	Question (1) (2)		05 05
Que-5	Question (1) (2)	1 & 2	05 05
	OR		
	Question (1) (2)	3 & 4	05 05

PRACTICAL EXAMINATION

SEMESTER – I

ZOOLOGY DSM-101P/Minor-1: NON CHORDATES-I and WILDLIFE

Time: 3 Hours

Total Marks: 25

Que. No.	Particulars	Marks
Que-1	Sketch and label _____ of <i>Amoeba proteus</i> . (Practical-4)	02
Que-2	Prepare temporary slide as per instruction and show it to examiner. (Practical-5)	02
Que-3	Do as per instruction and show it to examiner. (Practical-9/12)	02
Que-4	Write as per instruction. A. Identify and classify giving reasons (Practical-1/2) B. Identify and classify giving reasons (Practical-3) C. Identify and describe (Practical-6/7/8) D. Identify and describe (Practical-10/11)	08
Que-5	Certified Journal.	01
Que-6	Viva-voice.	10

Zoology Sem-I Multidisciplinary Course

Course Level	UG	Teaching Hours	45 + 30 = 75
Programme	Zoology	CCE (Theory)	25
Semester	I	CCE (Practical)	25
Course Type	Multidisciplinary Course	SEE	50
Course title	FUNDAMENTALS OF ZOOLOGY-1	Total	100
Credit	03 + 01 (Practical) = 04	Exam Duration	2:00 Hrs.
Course Code	MDC-101 MDC-101P (Practical)	Practical Exam Duration	2:00 Hrs.

Course Objectives:

- The focus of Cell Biology is the study of the structure and function of the cell. This course will focus on discovery and history of cell theory, basics of cell structure and cell communication.
- The students will be introduced to the principles of normal biological function in human body. Basic human physiology will be outlined and correlated with histological structures. Students will be exposed to the concept of how animals digest food and assimilate it. They also learn the physiology of how blood coagulate.
- The course also aims to provide an overview of genetics from the concept of gene to multiple alleles and its examples. The course will help in building sound fundamental knowledge of the principles of genetics, to be used as a stepping stone for higher studies and research in this field.

Course Learning Outcomes:

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

- Learn about the Cell discovery and cell theory, differences between Prokaryotic and Eukaryotic animal cells, structure of few cell organelles and types of Cell junctions.
- Know the principles of normal biological function in human body. Outline basic human physiology and correlate with histological structures. Understand how animals get nutrients and survive when injured in response to blood loss.
- Students will understand the reproductive organs and its functions in human and animals.
- Demonstrate an understanding of key concepts in ecology with emphasis on historical perspective, role of physical factors and concept of limiting factors. Understand ecosystem, types, their food chains and food webs. Apply the basic principles of ecology in wildlife conservation and management.
- Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.

FUNDAMENTALS OF ZOOLOGY-1

COURSE CONTENT		
Units	Title of the Unit and the Topics	No. of Lectures
Unit 1	Cell Biology 1.1 Cell discovery and cell theory (Robert Hook and Theodor Schwann), Prokaryotic and Eukaryotic animal cells 1.2 Cell organelles: (i) Lysosomes (ii) Golgi apparatus (iii) Centrioles and basal bodies (iv) Plasma membrane 1.3 Cell junctions: Tight junctions, Desmosomes, Gap junctions	12
Unit 2	Histology 2.1 Introduction of Histology, histological structure of the mammalian tissues: Squamous epithelium, Cuboidal epithelium, Columnar epithelium, Ciliated epithelium, Stratified epithelium, Areolar connective tissues, Bone, Cartilage connective tissue 2.2 Histological structure and function of following organs of Mammals (i) Stomach (ii) Intestine (Duodenum and Ileum) (iii) Liver (iv) Pancreas	12
Unit 3	Physiology 3.1 DIGESTION: (i) Physiology of ingestion, digestion and absorption of carbohydrates, proteins, lipids, nucleic acids in alimentary canal 3.2 BLOOD: (i) Composition of blood. (ii) Physiology of coagulation of blood	10
Unit 4	Genetics 4.1 Concept of Gene (Cistron, Recon, Muton, Jumping genes) 4.2 Multiple Alleles: (i) Characters of multiple alleles. (ii) The 'C' gene in Rabbit (Coat colour). (iii) A, B, AB & O blood groups in Humans. (iv) 'Rh' factor & Erythroblastosis foetalis.	11

FUNDAMENTALS OF ZOOLOGY-1

Based on ZOOLOGY MDC-101

Practical 1	Study of compound microscope.
Practical 2	To study typical Eukaryotic Cell (Onion cell/Human Cheek cell).
Practical 3	To study cell organelles with the help of permanent slides/charts/models (i) Lysosomes (ii) Golgi apparatus (iii) Centrioles and basal bodies (iv) Plasma membrane
Practical 4	To study Cell junctions: Tight junctions, Desmosomes, Gap junctions with the help of permanent slides/charts/models
Practical 5	To study histological structure of the mammalian tissues with the help of permanent slides/charts/models: Squamous epithelium, Cuboidal epithelium, Columnar epithelium, Ciliated epithelium, Stratified epithelium, Areolar connective tissues, Bone, Cartilage connective tissue
Practical 6	To study histological structure and function of following organs of Mammals (i) Stomach (ii) Intestine (Duodenum and Ileum) (iii) Liver (iv) Pancreas
Practical 7	Action of human salivary Amylase (ptyalin) on Starch.
Practical 8	To determine own blood group and Rh factor.
Practical 9	To study molecular structure of nitrogen bases (Through chart/model)
Practical 10	To study molecular structure of nucleoside, nucleotide, di-nucleotide and polynucleotide (Through chart/model)
Practical 11	Examples of Multiple Alleles : 3. The 'C' gene in Rabbit (Coat colour)- any four examples 4. A, B, AB and O blood groups in Humans-any four examples
Practical 12	To submit any chart/model/histological slides according to syllabus.

Reference Book

1. Cell Biology.....Dr. Satyeshchandra Roy
2. Cytology & Genetics.....P. K. Gupta
3. Cell & Molecular Biology.....De Robertis
4. Biotechnological Cell Biology.....V. B. Rastogi
5. Molecular Biology.....V. B. Rastogi
6. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology.....
.....P. S. Varma & V. K. Agrawal
7. Cytology, Genetics & Evolution.....P. K. Gupta
8. Animal physiology.....Eckert
9. Essential of animal physiology.....S. C. Rastogi
10. Element of animal physiology.....R. Nagabhushanam
11. Human physiology.....C. C. Chatterjee
12. Principal of animal physiology.....Wood D. W.
13. Physiology of anatomy and physiology.....Tortora & Tortora
14. Text book of Baley's Histology.....Copenharver bunga & burge
15. A text-book of the principles of animal histology..... Ulrie Dahlgren

BHAKTA KAVI NARSINH MEHTA UNIVERSITY, JUNAGADH**Theory Examination Paper Style NEP 2020****SEMESTER – I**

EXTERNAL ASSESSMENT BY UNIVERSITY			50
Marks			
Que. No.	Particulars	Unit	Marks
Que-1	Question (1) (2)	1	05 05
	OR		
	Question (1) (2)		05 05
Que-2	Question (1) (2)	2	05 05
	OR		
	Question (1) (2)		05 05
Que-3	Question (1) (2)	3	05 05
	OR		
	Question (1) (2)		05 05
Que-4	Question (1) (2)	4	05 05
	OR		
	Question (1) (2)		05 05
Que-5	Question (1) (2)	1 & 2	05 05
	OR		
	Question (1) (2)	3 & 4	05 05

PRACTICAL EXAMINATION

SEMESTER – I

MDC-101P/Multidisciplinary: FUNDAMENTALS OF ZOOLOGY-1

Time: 3 Hours

Total Marks: 25

Que. No.	Particulars	Marks
Que-1	Solve the examples of multiple allele. Each from Coat colour and blood group. (Practical-12 and 13).	02
Que-2	Do as per instruction and show it to examiner. (Practical-7/8).	02
Que-3	Do as per instruction and show it to examiner. (Practical-2).	02
Que-4	Write as per instruction. (A) Identify and describe (Practical-3/4) (B) Identify and describe (Practical-5) (C) Identify and describe (Practical-6) (D) Identify and describe (Practical-1/10)	08
Que-5	Certified Journal.	01
Que-6	Viva-voice.	10

Zoology Sem-I Skill Enhancement Course

Course Level	UG	Teaching Hours	60
Programme	Zoology	SEE	50
Semester	I	External Marks	25
Course Type	Skill Enhancement Course	Total	50
Course title	APICULTURE	Exam Duration	2:00 Hrs.
Credit	02	Teaching Hours	60
Course Code	SEC-101		

Course Objectives:

1. The learner will be able to understand the basics of beekeeping tools, equipment, and managing beehives.
2. The learner will be able to understand the primary life cycle of the honeybees, beekeeping tools and equipment.
3. The learner will be able to learn and manage beehives for honey production and pollination.
4. The course will be useful for providing self-employment to the learner.
5. The learner will be able to understand the marketing of various bee products.

Course Learning Outcomes:

The learner will be able to understand:

1. The learner will be able to manage beehives for honey production and pollination.
2. The course will be useful for providing self-employment to the learner.
3. The learner will be able to understand the marketing of various bee products.

APICULTURE

COURSE CONTENT		
UNIT -1	Practical 1	History and Classification of Honey Bees
	Practical 2	Biology of Bees
	Practical 3	Social Organization of Bee Colony
	Practical 4	Rearing of Bees
UNIT -2	Practical 5	Selection of Bee Species for Apiculture
	Practical 6	Bee Keeping Equipment
	Practical 7	Artificial Bee rearing (Apiary)
	Practical 8	Methods of Extraction of Honey (Indigenous and Modern)
UNIT -3	Practical 9	Bee Diseases and Enemies, Control and Preventive measures
	Practical 10	Bee Economy and Entrepreneurship in Apiculture
	Practical 11	Products of Apiculture Industry and its Uses (Honey, Bees Wax, etc.)

Reference Book for Zoology Skill Enhancement Course SEC-101

1. Text book of applied entomology.....Srivastava
2. Economic zoology.....Shukla & Upadhyaya
3. Honey bees and their management in India (ICAR).....R. C. Mishra
4. Beekeeping in India (ICAR).....S. Singh
5. Apiculture (Beekeeping).....Dr D K Belsare et al.

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EXTERNAL ASSESSMENT BY UNIVERSITY			50
Marks			
Que. No.	Particulars	Unit	Marks
Que-1	Question (1)	1	05
	(2)		05
	OR		
	Question (1)		05
	(2)		05
Que-2	Question (1)	2	05
	(2)		05
	OR		
	Question (1)		05
	(2)		05
Que-3	Question (1)	3	05
	OR		
	Question (1)		05

PRACTICAL EXAMINATION**SEMESTER – I SEC-101/ SKILL ENHANCEMENT COURSES**

Time: 3 Hours

Total Marks: 25

Que. No.	Particulars	Marks
Que-1	Do as per instruction and show it to examiner (Practical-1/2).	02
Que-2	Do as per instruction and show it to examiner. (Practical-3/4).	03
Que-3	Do as per instruction and show it to examiner. (Practical-5/6).	03
Que-4	Do as per instruction and show it to examiner. (Practical-7/8).	03
Que-5	Do as per instruction and show it to examiner. (Practical-9/10/11).	03
Que-6	Certified Journal.	01
Que-7	Viva-voice.	10