Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP -2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર S.Y.B.Sc. Zoology Sem.-3 & 4 Major, Minor, MDC અને SEC નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ સંદર્ભે ચર્ચા કરતાં પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૩૦/૦૪/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક : ૦૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ની સભાના ઠરાવ ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૪/૨૦૨૪ની સભાના ઠરાવ ક્રમાંકઃ૦૨

:: આથી ઠરાવવામાં આવે છે કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર B.Sc.Zoology સેમેસ્ટર–૩ અને ૪ નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ Major, Minor, MDC, અને SEC નો અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૯૯૩૨/૨૦૨૪
તા.૦૮–૦૫–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ,વીર નર્મદ દ.ગુ.યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - III

ZOOLOGY: ZO - MJ – 301 (MJ – Major)

(Effective from June - 2024)

(Biochemistry and Animal Physiology - I)

(02 credits = 02 Hours/Week)

Total Hours = 30

Program Outcome

- Develop knowledge of Animal physiology.
- Perform standard laboratory techniques to demonstrate and analyse procedures in the areas of Biochemistry.
- Communicate basic science effectively by written and computational means.
- Create scientific ideas from basic knowledge.

Course Outcome

- Define the carbohydrates, Protein and lipid
- Describe the basic structure and configuration of biomolecules.
- Prepare different type of solution and buffer.
- Explain process of digestion.
- An integrated Understanding of physiological mechanisms.
- Understood the blood composition.
- Describe coagulation of blood.
- Explain respiratory Pigment.

Unit:1: Biochemistry (15 Hours)

- ➢ Introduction
- ➢ Scope of biochemistry
- ➢ Water as biological solvent
- ➢ Weak acids and bases, pH and buffers

❖ Physiology of Digestion:

- ➢ Structural organization and functions of gastrointestinal tract and associated glands Mechanical and chemical digestion of food
- ➢ Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins
- ➢ Hormonal control of secretion of enzymes in Gastrointestinal tract

Unit:2 Physiology (15 Hours)

- ➢ Importance and scopes and branches of physiology
- ➢ Composition of blood and coagulation of blood
- ➢ Respiratory Pigments
- ➢ Heart- structure of the heart and Cardiac Cycle in Human

Faculty માં મંજૂર કરી
A.C.માં મુકવા જણાવેલ છે.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - III

ZOOLOGY: ZOP - MJ – 301 (MJ – Major)

(Effective from June - 2024)

(Biochemistry and Animal Physiology - I)

(02 credits = 04 Hours/Week)

Total Hours = 60

1. Laboratory general safety procedures
2. Preparation of standard solutions and buffers
3. Preparation of atomic models:
    - ❖ Monosaccharides:
        - ➢ Glyceraldehyde
        - ➢ Dihydroxy acetone
        - ➢ Ribose
        - ➢ Deoxy Ribose
        - ➢ Ribulose
        - ➢ Glucose
        - ➢ Galactose
        - ➢ Fructose
    - ❖ Disaccharides:
        - ➢ Maltose
        - ➢ Lactose
        - ➢ Sucrose
    - ❖ Amino acid:
        - ➢ Alanine
        - ➢ Valine
        - ➢ Aspartic acid
        - ➢ Glutamine
        - ➢ Tyrosine
    - ❖ Glycerol
4. Process of digestion (Mechanical and chemical digestion)
5. Estimation of haemoglobin in blood
6. Total count - RBC and WBC
7. Differential count of WBC
8. Structure of heart through chart

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER – IV

ZOOLOGY: ZO - MJ – 401 (MJ – Major)

(Effective from November - 2024)

(Biochemistry and Animal Physiology - II)

(02 credits = 02 Hours/Week)

Total Hours = 30

Course Outcome

- Described the physiology of excretory system of human beings.
- Explain structure and function ofnephrons
- Explain composition of urine
- Explain Osmoregulation
- Describe classification of carbohydrates, protein and lipid

Unit 1:BIOCHEMISTRY: **(15 Hours)**

- **Carbohydrates:**Structure and Biological importance
  - Monosaccharides
  - Disaccharides
  - Polysaccharides

- **Lipids**:
  - Structure and Significance
- **Physiologically importance:**
  - Saturated and unsaturated fatty acids
  - Tri-acylglycerols
  - Phospholipids
  - Glycolipids
  - Steroids

- **Proteins**: Amino acids
  - Structure, Classification and General properties of amino acids
  - Physiological importance of essential and non-essential amino acids
  - Introduction to simple and conjugated proteins
  - Bonds stabilizing protein structure
  - Denaturation of protein

UNIT 2:Renal Physiology **(15 Hours)**

- Structure of kidney and its functional unit
- Mechanism of urine formation
- Regulation of water balance
- Counter current mechanism
- Regulation of acid-base balance

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B. Sc. SEMESTER - IV
ZOOLOGY: ZOP - MJ – 401 (MJ – Major)
(Effective from November - 2024)
(Biochemistry and Animal Physiology - II)
(02 credits = 04 Hours/Week)
Total Hours = 60

PRACTICALS:

1 To study qualitative tests to identify functional groups of carbohydrates from given solutions (Glucose, Fructose, Sucrose, Lactose).

2 To study qualitative tests to identify functional groups of Protein from given solutions.

3 To study qualitative tests to identify functional of groups Lipid from given solutions.

4 To study qualitative tests of normal and abnormal constituentsfrom urine

References:

1 Biochemistry – Voet. D and Voet., J.G., John Wiley & Sons .

2 Textbook of Biochemistry – West.E.S., Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.

3 Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .

4 Principles and Techniques of Practical Biochemistry- Wilson, K. and Walker, J. Cambridge Press.

5 The Tools of Biochemistry- Cooper, T. G. John Wiley & Sons Press.

6 Physical Biochemistry- Friefelder, D. W.H. Freeman Press.

7 Analytical Biochemistry – Holme.D.J. and Peck.H., Longman.

8 Biophysical Chemistry: Principle and techniques- Upadhyay A, Upadhyay K and Nath. N. HimalayaPublishing House.

9 Experimental Biochemistry- Clark Jr. J.M and Switzer, R. L. Freeman &Co..

10 Textbook of Biochemistry and Human Biology – Talwar, G.P. and Srivastava. L.M., Printice Hall of India

11 Review of Medical Physiology-Ganong. McGraw-Hill.

12 Human Physiology – Chatterjee.C.C, Medical Allied Agency

13 Textbook of Medical Physiology – Guyton.A.G and Hall.J.E., Saunders

14 William's Textbook of Endocrinology – Larsen, R. P. Korenberg, H. N. Melmed, S. and Polensky, K.S. Saunders

15 Mammalian Biochemistry- White, A. Handler, P. and Smith, E. L. McGraw-Hill.

16 Textbook of Human Nutrition- Bamji, Pralhad Rao and Reddy V. Oxford & IBH Publishers.

17 Foods: Facts & Principle- Shakuntala and Shadaksharaswamy. Wiley Ester Press.

18 Essentials of Food and Nutrition – Swaminathan.M. Bangalore Press.

19 Human Nutrition and Dietetics. Davidson, S. and Passmore, J. R. ELBS. 20. A Textbook of Biochemistry: Molecular and Clinical Aspects. Nagini, S. Sci tech Publishers.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - III

ZOOLOGY: ZO - MJ – 302 (MJ – Major)

(Effective from June - 2024)

(Non chordates and Chordates - I)

(02 credits = 02 Hours/Week)

Total Hours = 30

Programme Outcomes

- Gain knowledge and skill in the fundamentals of animal sciences,
- Understands the complex relations among various living organisms.
- Analyze complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- Apply the knowledge of taxonomy to classify different non chordates and chordates animals
- Explain the complex evolutionary processes of animals.
- Describe the physiological processes of animals and relationship of organ systems.

Course outcome

- Know taxonomy of non-chordates and chordates animals
- Explain classification up to subclass of invertebrate and vertebrates phyla.
- Identify different animals of different phylum and class
- Know and explain different system of earthworm.
- Describe and draw different system of earthworm.
- Understand and explain different system of ***Labeo rohita***
- Explain and draw different system of ***Labeo rohita***.

UNIT–1 (A) Classification: **(15 Hours)**

- ❖ General study of Non-Chordate Phyla up to Sub class with examples:
  - ➢ Protozoa
  - ➢ Porifera
  - ➢ Coelenterata(Cnidaria)
  - ➢ Helminthes
  - ➢ Annelida

(B) Type study: Earthworm:

- ❖ Study of the following animal type with reference to the structure and functions of various organs of all systems of **Earthworm**:
  - ➢ Systematic position
  - ➢ Habit and Habitat

- External features
- Body wall and its function
- Coelom – composition and function
- Digestive system and digestion
- Food and feeding mechanism
- Circulatory system
- Excretory system and excretion
- Nervous system-(central, peripheral and sympathetic)
- Sense organs-Epidermal receptors, Buccal receptors and photoreceptors
- Reproductive system-copulation, cocoon formation and development

UNIT–2: **(15 Hours)**

(A) Classification:

General study of protochordates and chordates up to subclass with examples:

- Protochordata (Urochordata and Cephalochordata)
- Cyclostomata
- Pisces
- Amphibia

(B) Animal Type study: *Labeo rohita*

Study the ***Labeo rohita*** as an animal type with reference to their structure and functions of various organs of all systems.

- External characters
- Digestive system
- Respiratory system
- Circulatory systems (Heart, Arterial system and Venous system)
- Urinogenital system
- Brain

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - III

ZOOLOGY: ZOP - MJ – 302 (MJ – Major)

(Effective from June - 2024)

(Non chordates and Chordates - I)

(02 credits = 04 Hours/Week)

Total Hours = 60

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

1 –Classification of following animals up to sub class.

- **Protozoa**
  - Trypanosoma
  - Monocystis
  - Vorticella
- **Porifera**
  - Grantia
  - Euplectella
  - Spongilla
- **Cnidaria**
  - Hydra
  - Cyanea
  - Gorgonia
- **Helminthes**
  - Planaria
  - Taenia
  - Ascaris
- **Annelida**
  - Aphrodite
  - Tubifex
  - Hirudomedicinalis

2 - Earthworm:

- External features
- Digestive System

- Reproductive system
- Nervous system
- Mounting of Blood glands
- Mounting of setae
- Mounting of Septal nephridia
- Mounting of Spermatheca

3 - Permanent Slides of earthworm:

- T.S.passing through pharynx
- T.S.passing through gizzard
- T.S. passing through typhlosolar region
- T.S.passing through testis
- T.S.passing through ovary

4 -Classification of following animals up to sub-class:

- **Protochordata:**
  - Ascidian
  - Amphioxus
- **Cyclostomata:**
  - Myxine
- **Pisces:**
  - Stegostomata
  - Trygon
  - Chimaera
  - Protopterus
  - Polydon
  - Hilsa
  - Anabus
  - Opheocephalus
- **Amphibia:**
  - Uruaeotyphlus
  - Siren
  - Ambystoma
  - Rhacophorus
  - Frog

4.To study of Animal type:*Labeo rohita*

- Digestive system
- Urinogenital system
- Dorsal and ventral view of brain
- Mounting of Cycloid Scale

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - IV

ZOOLOGY: ZO - MJ – 402 (MJ – Major)

(Effective from November - 2024)

(Non chordates and Chordates - II)

(02 credits = 02 Hours/Week)

Total Hours = 30

Programme Outcomes

- Gain knowledge and skill in the fundamentals of animal sciences.
- Understands the complex relations among various living organisms.
- Analyze complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- Apply the knowledge of taxonomy to classify different non chordates and chordates animals
- Explain the complex evolutionary processes of animals.
- Describe the physiological processes of animals and relationship of organ systems.

Course outcome

- Know taxonomy of non-chordates and chordates animals
- Explain classification upto subclass of invertebrate and vertebrates phyla.
- Identify different animals of different phylum and class
- Know and explain different system of Pila.
- Describe and draw different system of Pila.
- Understand and explain different system of ***Uromastix***
- Explain and draw different system of ***Uromastix***.

UNIT- 1 **(15 Hours)**

(A) Classification:

- General study of Non-Chordate Phyla up to Subclass with examples:
  - Arthropoda
  - Mollusca
  - Echinodermata
  - Hemichordata.

(B) Type study:

- Study of the following animal types with reference to the structure and functions of various organs of all systems of **Pila**:
  - Classification and external characters

- Body wall and locomotion
- Digestive system
- Excretory system
- Nervous system and sense organs
- Reproductive system up to development

UNIT–2 **(15 Hours)**

(A) Classification:

- General study of the following Chordates up to sub class with examples:
  - Reptilia
  - Aves
  - Mammals

(B) Animal Type Study: Uromastix

- Study of the **Uromastix** with reference to the structure and functions of various organs of all systems:
  - External characters
  - Digestive system
  - Respiratory system
  - Circulatory systems
  - Urinogenital system
  - Brain

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - IV

ZOOLOGY: ZOP - MJ – 402 (MJ – Major)

(Effective from November - 2024)

(Non chordates and Chordates - II)

(02 credits = 04 Hours/Week)

Total Hours = 60

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

1. – Classification of following animals up to sub-class. (Withthe help of specimen, photographs, charts, models etc.)

- **Arthropda**
  - Peripetus
  - Hermit Crab
  - Julus
  - Palaemon
  - Termite
  - Butterfly

- **Mollusca**
  - Chaetoderma
  - Unio
  - Aplysia
  - Sepia

- **Echinodermata**
  - Anthena
  - Ophiocoma
  - Cucumaria
  - Featherstar

2. - Pila to be taught/studied only with the help of charts, models, videos, photographs, permanent slides, working models, simulators etc.

- External features
- Digestive system
- Reproductive system
- Nervous system
- Mountings:

- Radula
- Statocyst

3. - Classification of following animals upto sub-class. (with the help of specimens, photographs, charts, models etc.)

❖ **Reptilia:**
- Testudo
- Varanus
- Draco
- Python

❖ **Aves:**
- Vulture
- Wood packer
- Kiwi
- Koel

❖ **Mammalia:**
- Echidna
- American Koala
- Porcupine
- Dolphin

4. To study animal type: Uromastrix
- Digestive system
- Urinogenital system
- Dorsal and ventral view of brain

Reference Books for ZO – 302 & 402:

1 Living Invertebrates,1987: Pearse, Buchsbaum, Blackwell Scientific Publication, California.

2 A Text book of Zoology Invertebrates, Vol. I 1992, 7th Edn. Parker and Haswell edited by Marshall William, CBS publishers and distributors, New Delhi.

3 Invertebrate Zoology, 1992;S. N.Prasad, Vikas Publishing House, New Delhi.

4 Life of Invertebrates, 1992;S.N. Prasad, Vikas Publishing House, New Delhi.

5 Invertebrate Zoology, 19924th Edn., reprint, P.S.Dhami and J.K.Dhami, R.ChandandCo., New Delhi.

6 Modern textbook of Zoology, Invertebrates 10thEdn., 2009, R.L.Kotpal, Rastogipubl., Meerut.

7 Invertebrates Structure and Function, 2nd Edn.1979, EJW Barrington, John Wiley and Sons Inc.

8 Invertebrates Zoology, 1994, 6th Edition, Ruppert, E. Edward, R.D. Barnes; Saunders college Publishing, USA.

9 Invertebrate Zoology,1991, P. A. Meglitsch and F. R. Schram, Oxford University Press; New York.

10 Invertebrate: ANewsynthesis,1988, R.S.K.Barnes, P.Calow and P.J.W., Olive Blackwell Scientific, U.K.

11 An Introduction to Protochordata, 1990, H. S. Bhamrah and Kavita Juneja, Anmol publication, New Delhi.

12 The invertebrates: Protozoa through CtenophoraVol.I, 1959, Hyman, LibbieHenrietta, McGraw-Hill Book Co., Inc. New York.

13 A textbook of Zoology, Vol.II, 1990,T.J.Parker and W.A.Haswell, Lowprice Publication, Delhi.

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20 Comparative Anatomyof theVertebrates, G.C.Kent,R.KCarr, 9thEdn.,2001, McGraw Hill, Boston, USA

21 Practical Zoology Invertebrates,11threvised Edn.,2014,S.S.Lal,Rastogipubl.,Meerut.

22 Vertebrate Practical Zoology,11threvised Edition, 2014,S.S.Lal,Rastogipubl.,Meerut.

23 Practical Zoology, 2004, VijayLaxmiSharma, Paragon International Publishers.

24 The anatomy of Garden Lizard,1974,S.Y.Paranjape,PuneUniversityPublication,Pune

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - III

ZOOLOGY: ZO - MJ – 303 (MJ – Major)

(Effective from June - 2024)

(Biodiversity - I)

(04 credits = 04 Hours/Week)

Total Hours = 60

Program Outcomes (POs):

- Identify and classify different components of biodiversity, including genetic, species, and ecosystem diversity.
- Recognize the hotspots of biodiversity in India and develop conservation strategies specific to these regions.
- Evaluate the effectiveness of in-situ and ex-situ conservation methods for biodiversity conservation.
- Critically analyze the threats to biodiversity, such as habitat destruction, fragmentation, overexploitation, and pollution, and propose mitigation measures.

Course Outcomes (COs):

- Define biodiversity and explain its importance in maintaining ecological processes and ecosystem services.
- Describe the geological history and global scenarios of biodiversity.
- Differentiate between various elements and types of biodiversity, including genetic, species (alpha, beta, gamma), and ecological diversity.
- Identify and discuss the hotspots of biodiversity in India, with a detailed study of the Western Himalayas, Western Ghats, Gangetic Plains, and the Deccan Peninsula.
- Evaluate the different in-situ and ex-situ conservation strategies for biodiversity conservation and their relative advantages and limitations.
- Analyze the impact of human activities on biodiversity loss and the current rates of species extinction, leading to the understanding of the Holocene Mass Extinction event.

UNIT: I: **(15 Hours)**

- Introduction
- Definition
- Geological history of biodiversity - (global level scenario)

UNIT: II: **(15 Hours)**

- Elements/types of biodiversity:
- Genetic
- Species (alpha, beta, gamma)
- Ecological diversity

UNIT: III: **(15 Hours)**

- ➢ Hot spots of biodiversity in India:
- Introduction of total map of hot spots
- ➢ Detailed study following hot spots:
- Western Himalaya
- Western Ghats
- Gangetic planes
- Deccan peninsula

UNIT: IV: **(15 Hours)**

- ➢ Conservation of biodiversity:
- In-situ & ex-situ conservation

REFERENCE BOOKS:

1. Biodiversity – Mahesh Prasad singh, APH Publishing Corporation. New Delhi.
2. Environmental studies(U.G.C.syllabus) - N.Arumugam&V.Kumaresan. Saras publication, Kanyakumari
3. Biodiversity: principles&conservation-U.Kumar, M.J.Asija. Agrobios India - Jhodhpur.
4. Biodiversity in Indian Scenarios - N.Ramakrishnan. Daya publishing house - Delhi
5. Environmental Biology - H. R. Singh. S.Chand& Co. Ltd..NewDelhi
6. Biodiversity : Status &Prospects.Editors-Pramod Tandon, Manju Sharma Ram swarup. Narosa Publishing house Pvt. Ltd. New Delhi
7. Jaiv vividhta/jaivvaividhya-University Granthnirman board, Gandhinagar, Ahmedabad.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y. B. Sc. SEMESTER - IV
ZOOLOGY: ZO - MJ – 403 (MJ – Major)
(Effective from November - 2024)
(Biodiversity - II)
(04 credits = 04 Hours/Week)
Total Hours = 60

Program Outcomes (POs):

- Identify and classify the endangered and endemic species of plants and animals in India, and evaluate the factors responsible for their vulnerability.
- Analyze the interactions between species in different ecosystems, including aquatic, deep-sea, small island, marine, wetland, mangrove, and desert environments.
- Evaluate the biodiversity richness of specific protected areas in India, with its different biodiversity wild lifeand its National Park.
- Propose future strategies for the conservation of biodiversity in India, considering the unique challenges and opportunities in different regions.

Course Outcomes (COs):

- Define biodiversity and its components, and explain the importance of biodiversity in maintaining ecological balance and ecosystem services.
- Identify the threats to biodiversity, including their causes and responsible factors, with a focus on endangered and endemic species of plants and animals in India.
- Analyze the interactions between species in different aquatic ecosystems, including deep-sea and small island environments, and understand the importance of marine and wetland biodiversity.

UNIT-I: **(15 Hours)**

❖ Threats of biodiversity:

- Causes & responsible factors
- Endangered & endemic species of plants & animals of India

UNIT-II: **(15 Hours)**

❖ Aquatic biodiversity:

- Deep sea & small island biodiversity marine biodiversity
- Wetlands biodiversity

UNIT- III: **(15 Hours)**

❖ Mangrooves & deserts biodiversity:

➢ Study of following with reference to biodiversity:

- Jim Corbett National Park

- Keodadeo Ghana National Park
- Kaziranga National Park
- Mudumalai National Park

UNIT-IV: **(15 Hours)**

- ❖ Biodiversity conservation:
- In-situ and Ex-situ
- Future strategies for India

REFERENCE BOOKS:

1. Biodiversity- Mahesh Prasadsingh, APH Publishing corporation. New Delhi.
2. Environmental studies(U.G.C.syllabus)- N.Arumugam & V.Kumaresan. Saras publication, Kanyakumari
3. Biodiversity:principles&conservation-U.Kumar,M.J.Asija.AgrobiosIndia-Jhodhpur.
4. Biodiversity in Indian Scenarios-N.Ramakrishnan.Dayapublishinghouse-Delhi
5. Environmental Biology-H.R.Singh.S.Chand&Co.Ltd..NewDelhi
6. Biodiversity : Status &Prospects.Editors-Pramod Tandon, Manjusharma Ramswarup. Narosa Publishing house Pvt. Ltd. New Delhi
7. Jaivvividhta/jaivvaividhya-University Granthnirman board,Gandhinagar, Ahmedabad.
8. Vanya Jim Vigyan GujaratGrantg Norman Board.
9. The wild life of India,E.P.Gee, Harper Collins Publishers India.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S. Y. B. Sc. SEMESTER - III
ZOOLOGY: ZO - MDC – 301 (MDC – Multidisciplinary)
(Effective from June - 2024)
(Marine Biology) (04 credits = 04 Hours/Week)
(Total Hours = 60)

Program Outcome (PO):

- Demonstrate an in-depth knowledge of the geology of the ocean, including zonations and major water bodies in India.
- Analyze the causes and impacts of marine pollution and propose mitigation strategies.
- Understand the historical development, scope, and current status of aquaculture practices.
- Distinguish between different aquaculture practices, such as monoculture, poly culture, extensive culture, and intensive culture.

Course Outcome (CO):

- Describe the geological features and zonations of the ocean.
- Identify and locate major Indian Ocean water bodies, including the Andaman Sea, Arabian Sea, Bay of Bengal, Gulf of Eden, Gulf of Oman, Mozambique Channel, Persian Gulf, Red Sea, and Timor Sea.
- Analyze the causative factors and impacts of marine pollution.
- Trace the historical development of aquaculture and comprehend its current scope and status.
- Differentiate between various aquaculture practices, such as monoculture, poly culture, extensive culture, and intensive culture.
- Develop practical skills in data collection, analysis, and interpretation related to marine science.
- Appreciate the importance of sustainable practices in marine environments and their role in addressing real-world challenges.

Unit- 1: **(15 Hours)**

- Zonation of ocean
- Indian oceans:(Geological area and Biodiversity)
  - Andaman Sea
  - Arabian Sea
  - Bay of Bengal
  - Gulf of Eden
  - Gulf of Oman
  - Mozambique Channel
  - Persian Gulf
  - Red Sea
  - Timor Sea

Unit-2: **(15 Hours)**

- Marine Pollution:
  - Causative factors and impacts

Unit-3: **(15 Hours)**

- Introduction to aqua culture:
  - History
  - Scope
  - Present status

Unit-4: **(15 Hours)**

- General idea of different aquaculture practices:
  - Mono culture
  - Poly culture
  - Extensive culture
  - Intensive culture

Reference Books:

1. Fundamentals of Ecology- E. P. Odum
2. Marine biology and Ecology-N. K. Pillai
3. Fishes-Mary Chandy
4. Fish and Fisheries of India-V.G. Jhingran
5. Fish and Fisheries-S. S .Khanna
6. Marine Fish Farming for India-James Hornell
7. Introduction to Marine Biology-Karleskint
8. Marine fisheries Extension-P.N.Ananth
9. General and Applied Ichthyology (fish and fisheries)-S. K. Gupta & P. C. Gupta.: S. Chand and Co. New Delhi.
10. Aquaculture Technology & Environment-Ujwala Jadhav

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B.Sc. SEMESTER- III
ZOOLOGY: ZO - SEC – 301 (Skill Enhancement Course)
(Effective from June - 2024)
(Industrial Zoology)
(02 credits = 02 Hours/Week)(Total Hours = 30)

Program Outcome:

- The programme shall help students to understand importance and role of animals in an ecosystem.
- Understandthe applicationsoftechniquestovariousfieldsofbiology.
- The programme shall provide subject based skills of various fields that provide a base for future career in disciplines such as Health Sciences, Aquaculture, Agriculture, Environmental Management, Biotechnology, Publishing, Teaching and Research.

CourseOutcome:

- Gives thoughtful knowledge of making, processing and recent efforts of leather industry.
- Gives profound knowledge oftypes of different wool and its properties.
- Gives profound knowledge of various process involved in Fur and Fur Industry.

Unit I: (a) Leather Industry **(15 Hours)**

- Animals of Leather Industry
- Processing of skin industry
- Enemies of skin industry
- Recent efforts

(b) Wool Industry:

- Types of wool
- Physical and chemical properties of wool
- Removal of wool from sheep
- Recent efforts

Unit II: Fur and Fur Industry: **(15 Hours)**

- Introduction
- Fur as dyeing, Fur as dressing
- Fur Manufacturing
- Caring for fur
- Fur farming
- Fur in India, Markets and Marketing of fur

Reference Books:

1. Economic Zoology: G.S.Shukla&V.B.Upadhyay, Rastogi Publication, Meerut.
2. A Hand book on Economic Zoology: Dr.Jawaid Ahsan &Dr.Subhas Prasad Sinha
3. Applied and Economic Zoology: Tripurari Mishra

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
S.Y.B.Sc. SEMESTER- IV
ZOOLOGY: ZO - SEC – 401 (Skill Enhancement Course)
(Effective from November - 2024)
(Insect Control and management)
(02 credits = 02 Hours/Week)(Total Hours = 30)

Program Outcome:

- The course provides an insight into the types of insect pests and vectors and the factors driving their spread.
- It also enlightens about the methods used to bring down their population below the threshold for a better management.

Course Outcome:

- Identify the types of insect pests particularly the most common one.
- Know the methods of sampling of the pests.
- Understand the mode of action of nematicides and the consequences of their use.
- Understand the effective way of insect pest management strategy.

Unit I: House hold insects **(15 Hours)**

- Insects affecting human health: Bed bug, Wasp, House flies
- Insects damaging food products: Rice moth, Cheese skipper, Mung dhora
- Insects damaging house-hold goods:Carpet beetle, Blank ant, House cricket

Unit II: Insect pest control and management **(15 Hours)**

- Natural Control: Climatic factors, Topographic factors & Natural Enemies
- Applied Control: Mechanical and Physical
- Chemical Control: Insecticides
- Biological Control: Hormonal and Pheromonal
- Integrated Pest Management

Reference Books:

1. Economic Zoology: G. S. Shukla &V. B. Upadhyay, Rastogi Publication, Meerut.
2. A Hand book on Economic Zoology: Dr.Jawaid Ahsan &Dr.Subhas Prasad Sinha
3. Applied and Economic Zoology: Tripurari Mishra

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - IV

ZOOLOGY: ZO - ME – 401 (ME – Minor Elective)

(Effective from November - 2024)

(Non chordates and Chordates)

(02 credits = 02 Hours/Week)

Total Hours = 30

Programme Outcomes (PO)

- Gain knowledge and skill in the fundamentals of animal sciences,
- Understands the complex relations among various living organisms.
- Analyze complex interactions among the various animals of different phyla,their
- distribution and their relationship with the environment.
- Apply the knowledge of taxonomy to classify different non chordates and chordates animals
- Explain the complex evolutionary processes of animals.
- Describe the physiological processes of animals and relationship of organ systems.

Course outcome (CO):

- Know taxonomy of non-chordates and chordates animals
- Explain classification up to subclass of invertebrate and vertebrates phyla.
- Identify different animals of different phylum and class
- Know and explain different system of earthworm and Pila.
- Describe and draw different system of earthworm and Pila
- Understand and explain different system of *Labeo rohita*and
- Explain and draw different system of *Labeorohita* and *Uromastix*.

UNIT–1: **(15 Hours)**

(A) Classification:

- General study of Non-Chordate Phyla up to Sub class with examples:
  - Annelida
  - Mollusca

(B) Type study: Earthworm:

- Study of the following animal type with reference to the structure and functions of various organs of all systems of **Earthworm**:
  - Systematic position
  - Habit and Habitat
  - External features
  - Body wall and its function
  - Coelom – composition and function
  - Digestive system and digestion

- Food and feeding mechanism
- Circulatory system
- Excretory system and excretion
- Nervous system-(central, peripheral and sympathetic)
- Sense organs-Epidermal receptors, Buccal receptors and photoreceptors
- Reproductive system-copulation, cocoon formation and development

(C) Type study:

- Study of the following animal types with reference to the structure and functions of various organs of all systems of **Pila**:
  - Classification and external characters
  - Body wall and locomotion
  - Digestive system
  - Excretory system
  - Nervoussystem and sense organs
  - Reproductive system up to development

UNIT–2: **(15 Hours)**

(A) Classification: General study of protochordates and chordates up to subclass with examples:

- Pisces
- Reptilia

(B) Type study: *Labeo rohita*

Study the ***Labeo rohita*** as an animal type with reference to their structure and functions of various organs of all systems.

- External characters
- Digestive system
- Respiratory system
- Circulatory systems (Heart, Arterial system and Venous system)
- Urinogenital system
- Brain

(C) Animal Type Study: Uromastix

- Study of the **Uromastix** with reference to the irstructure and functions of various organs of all systems:
  - External characters
  - Digestive system
  - Respiratory system
  - Circulatory systems
  - Urinogenital system
  - Brain

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. B. Sc. SEMESTER - IV

ZOOLOGY: ZOP - ME – 401 (ME – Minor Elective)

(Effective from November - 2024)

(Non chordates and Chordates)

(02 credits = 04 Hours/Week)

Total Hours = 60

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

1.Classification of following animals up-to sub class.

- **Annelida**
  - Aphrodite
  - Tubifex
  - Hirudo medicinalis

- **Mollusca**
  - Chaetoderma
  - Unio
  - Aplysia
  - Sepia

2. Earthworm:

- External features
- Digestive System
- Nervous system
- Reproductive system
- Mounting of Septal nephridia
- Mounting of setae
- Mounting of Spermatheca
- Mounting of Blood glands

3. Permanent Slides of earthworm:

- T.S.passing through pharynx
- T.S.passing through gizzard
- T.S. passing through typhlosolar region
- T.S.passing through testis
- T.S.passing through ovary

4. Pila:

- External features
- Digestive system
- Reproductive system
- Nervous system
- Mountings:
  - Osphradium
  - Radula
  - Statocyst

5. Classification of following animals up to sub-class:

❖ **Pisces:**

- Stegostomata
- Trygon
- Chimaera
- Protopterus
- Polydon
- Hilsa
- Anabus
- Opheocephalus

❖ **Reptilia:**

- Testudo
- Varanus
- Draco
- Python

6. – Labeo:

- Digestive system
- Urinogenital system
- Dorsal and ventral view of brain
- Mounting of Cycloid scale

7. - Uromastrix

- Digestive system
- Urinogenital system
- Dorsal and ventral view of brain

Reference Books for ZO – 401:

1 Living Invertebrates,1987: Pearse, Buchsbaum, Blackwell Scientific Publication, California.

2 A Text book of Zoology Invertebrates, Vol. I 1992, 7th Edn. Parker and Haswell edited by Marshall William, CBS publishers and distributors, New Delhi.

3 Invertebrate Zoology, 1992;S. N.Prasad, Vikas Publishing House, New Delhi.

4 Life of Invertebrates, 1992;S.N. Prasad, Vikas Publishing House, New Delhi.

5 Invertebrate Zoology, 19924th Edn., reprint, P.S.Dhami and J.K.Dhami, R.Chand and Co., New Delhi.

6 Modern textbook of Zoology, Invertebrates 10thEdn., 2009, R.L.Kotpal, Rastogipubl., Meerut.

7 Invertebrates Structure and Function, 2nd Edn.1979, EJW Barrington, John Wiley and Sons Inc.

8 Invertebrates Zoology, 1994, 6th Edition, Ruppert, E. Edward, R.D. Barnes; Saunders college Publishing, USA.

9 Invertebrate Zoology,1991, P. A. Meglitsch and F. R. Schram, Oxford University Press; New York.

10 Invertebrate: ANewsynthesis,1988, R.S.K.Barnes, P.Calow and P.J.W., Olive Blackwell Scientific, U.K.

11 An Introduction to Protochordata, 1990, H. S. Bhamrah and Kavita Juneja, Anmol publication, New Delhi.

12 The invertebrates: Protozoa through CtenophoraVol.I, 1959, Hyman, LibbieHenrietta, McGraw-Hill Book Co., Inc. New York.

13 A textbook of Zoology, Vol.II, 1990,T.J.Parker and W.A.Haswell, Lowprice Publication, Delhi.

14 A text book of Zoology, Vol.II,1990, T.J.Parker and W.A.Haswell, Lowprice Publication, Delhi.

15 Modern Text Book of Zoology, 1992, R.L.Kotpal, Rastogi Publication, Meerut.

16 Chordate Zoology,1982, P.S.Dhami and J.K.Dhami, R.Chand and Co., New Delhi.

17 The life of Vertebrates, 3rd edn.1993, J.Z.Young ,Oxford University Press,USA.

18 The Phylum Chordata: Biology of Vertebrates and their Kin, 1987, H.H.Newman, Distributor Satish book enterprise, Agra.

19 A text book of Zoology, 1984, R.D.Vidyarthi, S.Chand and Co., NewDelhi.

20 Comparative Anatomy of the Vertebrates, G.C.Kent, R.KCarr, 9th Edn.,2001, McGraw Hill, Boston, USA

21 Practical Zoology Invertebrates,11threvised Edn.,2014,S.S.Lal,Rastogipubl.,Meerut.

22 Vertebrate Practical Zoology,11threvised Edition, 2014,S.S.Lal,Rastogipubl.,Meerut.

23 Practical Zoology, 2004, Vijay Laxmi Sharma, Paragon International Publishers.

24 The anatomy of Garden Lizard,1974,S.Y.Paranjape,PuneUniversityPublication,Pune