

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 of nephrons
- 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

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(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 constituents from 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.
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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



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(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. (With the help of specimen, photographs, charts, models etc.)

❖ **Arthropoda**

- 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 pecker
- Kiwi
- Koel

❖ **Mammalia:**

- Echidna
- American Koala
- Porcupine
- Dolphin

4. To study animal type: Uromastix

- 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, 1992^{4th} Edn., reprint, P. S. Dhami and J. K. Dhami, R. Chand and Co., New Delhi.
- 6 Modern textbook of Zoology, Invertebrates 10th Edn., 2009, R. L. Kotpal, Rastogi publ., Meerut.
- 7 Invertebrates Structure and Function, 2nd Edn. 1979, E. J. W. 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: A Newsynthesis, 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 Ctenophora Vol. I, 1959, Hyman, Libbie Henrietta, 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. Vidarthi, S. Chand and Co., New Delhi.
- 20 Comparative Anatomy of the Vertebrates, G. C. Kent, R. K. Carr, 9th Edn., 2001, McGraw Hill, Boston, USA
- 21 Practical Zoology Invertebrates, 11th revised Edn., 2014, S. S. Lal, Rastogi publ., Meerut.
- 22 Vertebrate Practical Zoology, 11th revised Edition, 2014, S. S. Lal, Rastogi publ., Meerut.
- 23 Practical Zoology, 2004, Vijay Laxmi Sharma, Paragon International Publishers.
- 24 The anatomy of Garden Lizard, 1974, S. Y. Paranjape, Pune University Publication, Pune

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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 life and 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. Jaivvidya/jaivvaividhya-University Granthnirman board,Gandhinagar, Ahmedabad.
 8. Vanya Jim Vigyan Gujarat Grantg Norman Board.
 9. The wild life of India,E.P.Gee, Harper Collins Publishers India.
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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 *Labeo rohita* 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
 - Nervous system 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 structure and functions of various organs of all systems:
 - External characters
 - Digestive system
 - Respiratory system
 - Circulatory systems
 - Urinogenital system
 - Brain

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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

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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.
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- 9 Invertebrate Zoology, 1991, P. A. Meglitsch and F. R. Schram, Oxford University Press; New York.
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- 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., New Delhi.
- 20 Comparative Anatomy of the Vertebrates, G. C. Kent, R. K. Carr, 9th Edn., 2001, McGraw Hill, Boston, USA
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- 22 Vertebrate Practical Zoology, 11th revised Edition, 2014, S. S. Lal, Rastogi publ., Meerut.
- 23 Practical Zoology, 2004, Vijay Laxmi Sharma, Paragon International Publishers.
- 24 The anatomy of Garden Lizard, 1974, S. Y. Paranjape, Pune University Publication, Pune

