



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, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227312

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 ૨૦૨૩-૨૪ ના ડિસેમ્બર-૨૦૨૩ થી અમલમાં આવનાર B.Sc. Zoology Sem.-2 નો Major, Minor, MDC અને SEC ના અભ્યાસક્રમ સંદર્ભે પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૦૨/૧૨/૨૦૨૩ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૬/૧૨/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક: ૩૦ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૦૨/૧૨/૨૦૨૩ ની સભાનાં ઠરાવ ક્રમાંક:૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ ના ડિસેમ્બર-૨૦૨૩ થી અમલમાં આવનાર NEP-2020 અંતર્ગત B.Sc.Zoology સેમેસ્ટર-૨ નો Major, Minor, MDC, અને SEC નો અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૦૬/૧૨/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક: ૩૦

:: આથી ઠરાવવામાં આવે છે કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ના ડિસેમ્બર-૨૦૨૩ થી અમલમાં આવનાર B.Sc. Zoology Sem.-2 નો Major, Minor, MDC અને SEC ના અભ્યાસક્રમ સંદર્ભે પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૦૨/૧૨/૨૦૨૩ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૩૦૫૧૨/૨૦૨૩
તા.૦૭-૧૨-૨૦૨૩


કુલસચિવ

પ્રતિ,

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

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F.Y.B.Sc. SEMESTER - II

ZOOLOGY: ZO - MJ - 201 (MJ - Major)

(Effective from December - 2023)

(Non chordates & Chordates Animal Diversity)

(03 credits = 03 Hours/Week)

Total Hours = 45

UNIT - I: Non-Chordate Animal Diversity:

(15 Hours)

- **Phylum Protozoa:** Nutrition.
- **Phylum Porifera:** Spicules.
- **Phylum Cnidaria:** Types of corals reef and its economics importance.
- **Phylum Platyhelminthes and Nematelminthes:** Parasitic adaptation.

UNIT - II: Non-Chordate Animal Diversity:

(15 Hours)

- **Phylum Annelida:** Metamerism.
- **Phylum Arthropoda:** Metamorphosis in Insects.
- **Phylum Mollusca:** Shell in Mollusca.
- **Phylum Echinodermata:** Water vascular system in Asteroidea.

UNIT - III: Chordate Animal Diversity:

(15 Hours)

- **Phylum Pisces:** Difference between Osteichthyes and Chondrichthyes.
- **Phylum Amphibia:** Parental care in Amphibia.
- **Phylum Reptilia:** Poisonous and non Poisonous snakes.
- **Phylum Aves:** Types of beak and feet.
- **Phylum Mammals:** Prototheria, Metatheria and Eutheria.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS – ZOP - MJ – 1 (Based on Paper- ZO – MJ – 201)
(Effective from December - 2023) (01 credits = 02 Hours/Week)
(Total Hours = 30)

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

1. Protozoa: To study Nutrition in:

- Paramecium
- Amoeba
- Euglena
- Monocystis
- Opalina

2. Porifera: To study spicules and gemmules in:

- Sponge spicules
- gemmules

3. Cnidaria:

- Atoll reef
- Fringing reef
- Barrier reef

4. Platyhelminthes and Nemathelminthes:

- To study parasitic adaptation of tapeworm and Round worm

5. Annelida: To study Metamerism:

- Leech
- Earthworm

6. Arthropoda: To study Metamorphosis in Insects:

- Bombax mori

7. Mollusca: To study Shell in Mollusca:

- Sepia
- Pila
- Pearl oyster

8. Echinodermata:

- Water vascular system in Asteroidea

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9. Pisces: Difference between Osteichthyes and Chondrichthyes:

- Catla
- Shark

10. Amphibia : To study parental care in:

- Alytes
- Hyber faber
- Pipa Americana
- Salamander
- Autodax
- Ichthyophis

11. Reptilia: Poisonous and non Poisonous snakes:

- Dhaman
- Python
- Indian sand boa (Eryx)
- Viper
- Krait
- Cobra
- Sea Snake

12. Aves:

- Types of beak and feet

13. Mammals:

- Duck bill platypus
 - Kangaroo
 - Dolphin
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F. Y.B.Sc. SEMESTER - II

ZOOLOGY: ZO - MJ – 202 (MJ – Major)

(Effective from December - 2023)

(Ecological adaptation, Evolution and Ethology, Wildlife Biology)

(03 credits = 03 Hours/Week) Total Hours = 45

UNIT- I: Ecological Adaptations: (15 Hours)

- Aquatic Adaptations
- Arboreal Adaptations
- Volant Adaptations
- Desert Adaptations

UNIT- II: Evolution and Ethology: (15 Hours)

❖ **Evolution:**

- Homologous organs
- Analogous organs
- Connecting link
- Vestigial organs

❖ **Ethology:**

- Introduction, Scope and patterns of behavior
- Nesting behavior (Weaver bird, Horn bill) and social behavior (termites)

UNIT- III: Wild life Biology: (15 Hours)

❖ **Wild life:**

- Introduction, causes of depletion of wild life
- Importance of conservation of wild life
- Difference between National Parks and Sanctuaries

❖ **Wildlife in Gujarat:**

✓ **National Parks:**

- Gir National Park
- Marine National Park
- Vansda National Park
- Velavadar black buck National Park

❖ **Sanctuaries:**

- Wild ass sanctuary
- Thol wildlife sanctuary

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.
F.Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS – ZOP - MJ – 2 (Based on Paper- ZO – MJ – 202)
(Effective from December - 2023) (01 credits = 02 Hours/Week)
(Total Hours = 30)

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

1. Study of Ecological adaptations:

(a) Arboreal adaptations:

- Chameleon
- Squirrel

(b) Volant adaptations:

- Flying fish
- Draco

(c) Desert adaptations

- Camel
- Phrynosoma

(d) Aquatic adaptations:

- Flat fish
- Sucker fish

2. To study Evolution characteristics:

(a) Homologous organs:

- Forelimbs and hind limbs of chordates

(b) Analogous organs:

- Wings of butterfly, Birds and Bats

(c) Connecting link:

- Duck bill Platypus
- Peripatus
- Archaeopteryx

(d) Vestigial organs:

- Caecum and Vermiform appendix in man
- Hindlimbs in python
- Leg in whale



3. To study nesting behavior and social behaviour:

- Weaver bird
- Horn bill

4. To study life history of termites:

- Queen
- Drones
- Workers
- Soldiers

5. Study of national parks and Sanctuaries:

- Gir National Park
 - Marine National Park
 - Vansda National Park
 - Velavadar National Park
 - Wild ass Sanctuary
 - Thol Sanctuary
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER - II

ZOOLOGY: ZO - ME – 201 (ME – Minor Elective)
(Effective from December - 2023)

(Chordates Animal Diversity, Evolution and Ethology, Ecological adaptation and
Wildlife Biology) (02 credits = 02 Hours/Week) Total Hours = 30

UNIT – I - A: Chordate Animal Diversity: (08 Hours)

- **Phylum Pisces:** Difference between Osteichthyes and Chondrichthyes.
- **Phylum Amphibia:** Parental care in Amphibia.
- **Phylum Reptilia:** Poisonous and non Poisonous snakes.
- **Phylum Aves:** Types of beak and feet.
- **Phylum Mammals:** Prototheria, Metatheria and Eutheria.

UNIT- I - B: Evolution and Ethology: (07 Hours)

❖ **Evolution:**

- Homologous organs
- Analogous organs
- Connecting link
- Vestigial organs

❖ **Ethology:**

- Introduction, Scope and patterns of behavior
- Nesting behavior (Weaver bird, Horn bill) and social behavior (termites)

UNIT- II - A: Ecological Adaptations: (08 Hours)

- Aquatic Adaptations
- Arboreal Adaptations
- Volant Adaptations
- Desert Adaptations

UNIT- II - B: Wild life Biology: (07 Hours)

❖ **Wild life:**

- Introduction, causes of depletion of wild life
- Importance of conservation of wild life
- Difference between National Parks and Sanctuaries

❖ **Wildlife in Gujarat:**

- ✓ **National Parks:**
- Gir National Park

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- Marine National Park
- Vansda National Park
- Velavadar black buck National Park

❖ **Sanctuaries:**

- Wild ass sanctuary
- Thol wildlife sanctuary

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F. Y.B.Sc. SEMESTER- II
ZOOLOGY PRACTICALS – ZOP - ME – 1 (Based on Paper - ZO – ME – 201)
(Effective from December - 2023) (02 credit = 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. Pisces: Difference between Osteichthyes and Chondrichthyes:

- Catla
- Shark

2. Amphibia: To study parental care in:

- Alytes
- Hyber faber
- Pipa Americana
- Salamander
- Autodax
- Ichthyophis

3. Reptilia: Poisonous and non Poisonous snakes:

- Dhaman
- Python
- Indian sand boa (Eryx)
- Viper
- Krait
- Cobra
- Sea Snake

4. Aves:

- Types of beak and feet

5. Mammals:

- Duck bill platypus
- Kangaroo
- Dolphin

6. To study Evolution characteristics:

(a) Homologous organs:

- Forelimbs and hind limbs of chordates

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(b) Analogous organs:

- Wings of butterfly, Birds and Bats

(c) Connecting link:

- Duck bill Platypus
- Peripatus
- Aercheopteryx

(d) Vestigial organs:

- Caecum and Vermiform appendix in man
- Hindlimbs in python
- Leg in whale

7. To study nesting behavior and social behaviour:

- Weaver bird
- Horn bill

8. To study life history of termites:

- Queen
- Drones
- Workers
- Soldiers

9. Study of Ecological adaptations:

(a) Arboreal adaptations:

- Chameleon
- Squirrel

(b) Volant adaptations:

- Flying fish
- Draco

(c) Desert adaptations

- Camel
- Phrynosoma

(d) Aquatic adaptations:

- Flat fish
- Sucker fish

10. Study of national parks and Sanctuaries:

- Gir National Park
- Marine National Park
- Vansda National Park

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- Velavadar National Park
 - Wild ass Sanctuary
 - Thol Sanctuary
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Reference Books:

1. Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
 2. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The*
 3. *Invertebrates: A New Synthesis*, III Edition, Blackwell Science
 4. Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
 5. Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
 6. Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford University press.
 7. Modern Text Book of Zoology (vertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
 8. Modern Text Book of Zoology (invertebrate) R.L.Kotpal, Rastogi Publication, Meerut, India.
 9. Invertebrate Zoology- E.L.Jordan & P.S.Verma
 10. Invertebrate Zoology- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
 11. Introduction to Chordates- T.C. Majupuria, Pradeep Publication, Jalandhar, India.
 12. A manual of Practical Zoology Invertebrates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
 13. A manual of Practical Zoology Chordates- P.S.Verma, S. Chand & Co. Ltd. New Delhi, India.
 14. Modern zoology – Dr. Ramesh Gupta, Prakash Publication, 12th Edition, Muzaaffarnagar (UP)
 15. A Text Book of Zoology- Dr. Alkesh I. Shah & Dr. Krishna R. Rajput, New Popular Prakashan, Surat, India.
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F.Y.B.Sc. SEMESTER - II
ZOOLOGY: ZO - MDC – 201 (MDC – Multidisciplinary)
(Effective from December - 2023)
(Marine Science) (04 credits = 04 Hours/Week)
(Total Hours = 60)

Unit-1 Scope of marine science: (15 Hours)

- Introduction to marine science and career
- Evolution and biological classification
- Prokaryotes, eukaryotes - fungi, Protista, plant, animalia - five Kingdoms

Unit-2 Marine Biology: (15 Hours)

- Adaptations - bony fish surviving in near freezing water, sea birds, whales and their relations
- Voyage of green sea turtle
- General characters of bony and cartilaginous fishes

Unit-3 Types of seashores and their fauna: (15 Hours)

- Sandy shore
- Rocky shore
- Estuaries

Unit-4 Marine organisms: (15 Hours)

- Microorganisms: - phytoplanktons, zooplanktons, red algae, brown algae, green algae, multicellular algae. Economic importance of algae
- Macro organisms: - Invertebrates-commercial importance of marine sponges, Molluscs, arthropods (crab and prawns)
- Vertebrate: economic importance of Scoliodon (sharks) and marine mammals

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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. Economic Zoology- Dr.G.S.Shukla & Dr.V.B.Upadhyay
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F. Y. B. Sc. SEMESTER- II
ZOOLOGY: ZO - SEC – 201 (Skill Enhancement Course)
(Effective from December - 2023)
(Poultry farming) (02 credits = 02 Hours/Week) (Total Hours = 30)

Program Outcome:

1. The programme shall help students to understand importance and role of animals in an ecosystem.
2. Understand the applications of techniques to various fields of biology.
3. 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.

Course Outcome:

1. The student shall have basic knowledge about subject.
2. The student shall have basic knowledge identification and importance of breeds of poultry farming.

Unit I:

- Introduction, history and importance of poultry farming
- Construction of poultry housing systems
- Types of poultry housing systems
- Poultry management and factor involved in poultry management

Unit II:

- Indian Breeds of poultry
- Exotic Breeds of poultry
- Care of egg laying hen
- Traditional method of poultry appliances: Brooder, Feeder, Water Appliances
- Modern method of poultry appliances: Brooder, Feeder, Water Appliances
- Excreta as manure
- Use of Poultry feathers

References:

1. Economic Zoology: G. S. Shukla & V. B. Upadhyay, Rastogi Publication, Meerut.
2. <https://www.pashudhanpraharee.com/types-of-poultry-housing-systems/>
3. <https://www.agrifarming.in/poultry-housing-types-equipment-and-construction>
4. <https://www.fao.org/3/i3531e/i3531604.pdf>

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
F. Y.B.Sc. SEMESTER- II
ZOOLOGY: ZO - SEC – 202 (Skill Enhancement Course)
(Effective from December - 2023)
(Medical Diagnostics) (02 credits = 02 Hours/Week) (Total Hours = 30)

Objective of this course

This course will introduce the students about the fundamental concepts of medical technology. It will familiarize the students regarding various dimensions of medical lab technology, help in understanding clinical significance of different tests and career opportunities available in this area.

Unit 1: Clinical Pathology:

- Biological specimen and its collection
- Basic concept of Complete Blood Count (DLC, TLC, TPC, Hb, PCV)
- Blood group test
- Lipid profile
- Urine test
- Liver Function test
- Kidney/Renal function test.
- Biopsy and their clinical significance

Unit 2: Medical Imaging Techniques:

- Introduction to ECG (Electrocardiogram)
- Angiography
- ECG (Echocardiogram)
- EEG (Electroencephalogram)
- Sonography
- X-ray
- CT (Computed tomography) scan
- MRI (Magnetic Resonance Imaging)
- PET (Positron emission tomography) scan

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References:

1. Kanai Mukherjee, Medical Laboratory Techniques Vol-I, II, III, Tata MC Graw Hill Publishing company
 2. Robbins and Cortan, Pathologic Basis of Disease, VIII Edition, Saunders.
 3. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
 4. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
 5. Dr. K. N. Sachdev, Jaypee Brothers, (1988) Clinical Pathology and bacterial and medical publisher
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