



Re-Accredited by NAAC with 'A' Grade  
**VEER NARMAD SOUTH GUJARAT UNIVERSITY**  
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India

**વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી**

યુનિવર્સિટી કેમ્પસ, ઉધના-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 ઝૂઓલોજી વિષય ચલાવતી સંલગ્ન અનુસ્નાતક કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર M.Sc.Sem-III & IV નાં અભ્યાસક્રમ અંગે વિચારણા કરતા પ્રાણીશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૦૪/૦૪/૨૦૧૯ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે કરેલ નીચેની ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૧૪ અન્વયે સ્વીકારી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૦૭/૦૬/૨૦૧૯ની સભાના ઠરાવ ક્રમાંક: ૬૫ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદુપરાંત તેનો અમલ કરવો.

**પ્રાણીશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૦૪/૦૪/૨૦૧૯ની સભાનાં ઠરાવ ક્રમાંક: ૨**

:: આથી ઠરાવવામાં આવે છે કે, M.Sc.Sem-III & IV નો પ્રાણીશાસ્ત્ર વિષયનો અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

**વિજ્ઞાન વિદ્યાશાખાની તા.૦૨/૦૫/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૧૪**

:: આથી ઠરાવવામાં આવે છે કે, M.Sc.Sem-III & IV નો પ્રાણીશાસ્ત્ર વિષયનો અભ્યાસક્રમ સ્વીકારી તે મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

**એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૧૯ ની સભાનાં ઠરાવ ક્રમાંક: ૬૫**

:: આથી ઠરાવવામાં આવે છે કે, વિજ્ઞાન વિદ્યાશાખાએ તેની તા. ૦૨/૦૫/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક : ૧૪ અન્વયે ભલામણ કરેલ શૈક્ષણિક વર્ષ ૨૦૧૯-૨૦ થી અમલમાં આવનાર M.Sc.Sem-III & IV નો પ્રાણીશાસ્ત્ર વિષયનો અભ્યાસક્રમ સ્વીકારી મંજૂર કરવામાં આવે છે.

ખિડાણ:ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૧૦૪૫૬/૧૯

તા. ૨૧-૦૬-૨૦૧૯

ઈ.ચા. કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની ઝૂઓલોજી વિષય ચલાવતી સંલગ્ન અનુસ્નાતક કોલેજોના આચાર્યશ્રીઓ.
- 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**

**Course: M.Sc. Zoology**

**Syllabus for Semester III and Semester IV**

(Credit Based Semester and Grading System with effect  
from the academic year 2019-20)

**M.Sc. Zoology Syllabus Semester-III and Semester-IV****Credit Based and Grading System****To be implemented from the Academic year 2019-2020****Z-3001: Cell Biology and Genetics(Theory)(60 hrs.)**

<b>Unit-1:</b>	<b>15 hrs</b>
An overview of Cells, Plasma Membrane, Nucleus, Mitochondria and Peroxisomes, E.R. Lysosomes, Golgi body	
<b>Unit-2:</b>	<b>15 hrs</b>
Cytoskeleton and Cell Movement, Cell Cycle, Cell Signaling, Cell Death Mechanisms, Protein Sorting and Transport	
<b>Unit-3:</b>	<b>15 hrs</b>
Introduction to Genetics, Mendelian Genetics, Linkage and Crossing Over	
<b>Unit-4:</b>	<b>15 hrs</b>
Chromosomal Mapping, Mutations, Sex Determination, Extrachromosomal Inheritance	

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**Z-3001: Cell Biology and Genetics (Practicals)**

1. Study of typical animal cell and cell organelles.
2. Preparation of temporary stained squash of onion root tip to study various stages of mitosis.
3. Preparations of temporary mount of grasshopper/cockroach testis to study the different stages of meiosis.

4. Stained preparation of the mitochondria in striated muscle cells/cheek epithelial cells using Janus green.
5. Mendelian laws and gene interaction using *Drosophila* crosses.
6. Study of Linkage, recombination, gene mapping using marker based data from *Drosophila*.
7. Study of Human Karyotype (normal and abnormal).
8. Pedigree analysis of some human inherited traits.

### **SUGGESTED REFERENCES:**

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin, J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). VIII ed. Principles of Genetics. Wiley India.
6. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
7. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.
8. Russell, P. J. (2009). iGenetics- A Molecular Approach. III Edition. Benjamin Cummings.
9. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
10. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley & Sons.
11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis. W. H. Freeman and Co.

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**Z-3002: Chronobiology and Animal Behaviour(Theory)(60 hrs.)****Unit-1: 15 hrs**

Chronobiology, Biorhythms, Biological Clocks,Importance of biological clocks

**Unit-2:15 hrs**

Introduction to Animal Behaviour,Patterns of Behaviour, Social and Sexual Behaviour

**Unit-3: 15 hrs**

Instinctive and learning behaviour, Fixed action pattern, Communication in honeybees (dance Language and pheromone), Elements of Sociobiology : Altruism and selfishness, Social organization in termites (including Eusociality, castes in termites)

**Unit-4: 15hrs****Foraging:** Optimal foraging theory, Foraging and predation risk: defense strategies against predators, Territoriality and Group foraging

**Aggression:**

Aggressive behavior, Game theory models and strategies

**Sensory system and Communication:**

Signal content and structure, Orientation and cues

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**Z-3002: Chronobiology and Animal Behaviour (Practicals)**

1. To study circadian rhythms in humans (Eating, Sleep, Temperature pattern).
2. Study and construction of Actogram using a suitable animal model.
3. To study Nest and Nesting behavior in Birds and Social insects.
4. To study geotaxic behaviour in earthworm.
5. To study the phototaxic behaviour in insect larvae.
6. Visit to a National Park/ Wildlife Sanctuary/ Biodiversity Park etc. in order to study biological clocks and behaviour of animals.

**References:**

1. John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.
2. Manning, A. and Dawkins, M. S, An Introduction to Animal Behaviour, Cambridge, University Press. UK.
3. David McFarland, Animal Behaviour, Pitman Publishing Limited, London, UK.
4. Insect Clocks D.S. Saunders, C.G.H. Steel, X., Afopoulou (ed.)R.D. Lewis.(3<sup>rd</sup> Ed.) Baren and Nobel Inc. New York, USA.
5. The Clock that times us. 1982. Moore Ed et al.
6. Biological Rhythms: Vinod Kumar (2002) Narosa Publishing House, Delhi/ Springe-Verlag, Germany.

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**Z-3003: Project/Dissertation )(60 hrs.)**

The learning objective of the paper will enrich the students with basic principle of research methodology which help the students to learn essential steps involved in research.

\*Project work should be done individually on any topic of importance related to the subject.

\* Project may be done in-house or at a recognized institution outside the campus as specified in the guidelines.

\* The concerned candidates have to submit their Project/Dissertation in a standard Hard-Bound thesis format.

\*The Thesis will be evaluated by an external examiner.

\*The Project/Dissertation must be presented in a Power-Point Presentation by the concerned candidates within 15 minutes during their Dissertation Viva

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**Z-3004: Review Article )(60 hrs. )**

1. Students will be individually allotted a research paper for review.
2. The selected paper should be from a reputed peer reviewed journal having ISSN.
3. Selected Research paper should have been published during the last five years.
4. The research paper should not exceed 15 pages including references.
5. Students have to answer the questionnaire as per the attached format and submit it to the department

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**Z-4001: Human Anatomy and Parasitology (Theory)(60 hrs.)****Unit-1: 15 hrs**

Structure and functions of different organs of Digestive system, Respiratory system and Circulatory system

**Unit-2: 15 hrs**

Structure and functions of different organs of Excretory system, Nervous system and Reproductive system

**Unit-3****15hrs**

Introduction to Parasitology, Host –Parasite Interaction, Epidemiology of Infectious Diseases: Its pathogenicity, symptoms, control and treatment (H<sub>1</sub>N<sub>1</sub>, HIV, Zika, Polio, Chikungunya)

**Unit-4****15hrs**

Study of life cycle of Hookworm (*Ancylostoma duodenale*), *Entamoeba histolytica*, *Pediculus humanus*. Study of mouth parts of *Culex*, *Anopheles*, *Aedes aegypti*.

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**Z-4001: Human Anatomy and Parasitology(Practicals)**

The following Practical to be taught/studied through permanent slides/photomicrographs/specimens / charts /models etc.

1. Study of human Digestive system and Respiratory system
2. Study of human Circulatory system and Excretory system
3. Study of human Nervous system and Reproductive system
4. Study of Measles, HIV, Zika, Polio, Chikungunya viruses and symptoms
5. Study of life cycle of Hookworm (*Ancylostoma duodenale*), *Entamoeba histolytica*, *Pediculus humanus*



## 6. Study of mouth parts of Culex, Anopheles, Aedes aegypti, Pediculus.

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### **SUGGESTED REFERENCES:**

1. Park, K. (2007) Preventive and social medicine. XVI Edition. B.B Publisher.
2. Arora, D.R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributers.
3. Chaudhury, S.K. (1996) Practice of fertility Control, A Comprehensive Textbook. B.I.Churchill Livingston Pvt Ltd, India.
4. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher.
5. Hafez, E. S. E. and Evans, T. N. (1973). Human Reproduction: Contraception and Conception. Harper and Row, New York.
6. Atwal, A. S. (1993) Agricultural Pests of India and South East Asia. Kalyani Publishers, New Delhi.
7. Pradhan, S (1983) Insect Pests of Crops. National Book Trust, India.
8. Prost, P.J. (1962) Apiculture. Oxford and IBH, New Delhi.
9. Knobil, E. & Neill, J.D. (2006) The Physiology of Reproduction, Vol. 2, Elsevier Pub.
10. Srivastava, C.B.L. (1999) Fishery Science and Indian Fisheries. KitabMahal publications, India.
11. Dunham R.A. (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
- 12.. Berry A. K. (2012) A Text Book of Animal Physiology. XI<sup>th</sup> ed. Reprinted. Emkay Publication , Delhi-110051.

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**Z-4002: Applied and Economic Zoology (Theory)(60 hrs.)**

**Unit-1: 15 hrs**

Poultry Breeding: Habitat of fowl, food and feeding of fowl, Breeds of fowl, Breeding in fowls, Eggs and hatching, Rearing of chickens, Diseases of Poultry, Poultry Products

**Unit-2: 15 hrs**

Aquaculture :Scope,history and present status.different systems of Aquaculture,Cultivable fish species,Planning, layout and construction of fish farm,other culture practices

**Unit-3: 15 hrs**

Dairy Farming:Indian and Exotic Breeds of cow sand buffaloes, Breeding,Feeding Stuffs, Feeding of Young Stock,Diseases,Milk, Milk Products,

**Unit-4: 15 hrs**

Apiculture:Types and cast of Honey Bee,Social Organization ofHoney Bee, life historyHoney Bee, structure of bee hive,flora of Apiculture,Methods of bee keeping,Products of bee keeping, bee enemies(predators),diseases ofHoney Bee

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**Z-4002: Applied and Economic Zoology(Practicals)**

1. Study ofPoultry Diseases: Ranikhet,Fowl pox, Tick fever, Tuberculosis, Fowl cholera, Avian leucosis, Infectious coryza, Rickets, Nutritional Roup ,Crop bound,Feather picking,Perosis,Coccidiosis,Round worm.Study ofBreeds of fowl
2. Study ofCultivable fish species
3. Study ofDiseases seen in Cows and Buffaloes:
4. Study ofDiseases of Honey Bee: Broud foul, Nosema diseases, Amoeba diseases, Acarine diseases
5. Visit to poultry farm/ animal breeding centre/.fish farm/honey bee keeping. Submission of visit report

## 6. Maintenance of freshwater aquarium.

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### **SUGGESTED REFERENCES:**

1. Park, K. (2007) Preventive and social medicine. XVI Edition. B.B Publisher.
2. Gupta S.K.,Gupta P.C.(2006) Genera and Appied Ichthyology.
3. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea &Fabiger Publisher.
4. Tomar B.S. (2011) Introduction To Economic Zoology. Emkay Publications, Delhi- 110051.
5. Jawaid Ahsan,(1985) A Handbook on Economic Zoology,S.Chand & Company Ltd.,New Delhi
6. Pradhan, S (1983) Insect Pests of Crops. National Book Trust, India.
7. Prost, P.J. (1962) Apiculture. Oxford and IBH, New Delhi.
8. Srivastava, C.B.L. (1999) Fishery Science and Indian Fisheries. KitabMahal publications, India.
9. Dunham R.A. (2004) Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
- 10.Barbara R.L.,Scott,Foreman & Company:Engaland,1972.Essential human anatomy and Physiology
11. G.J.Tortara,John Wiley & sons,(2003),New York,Atlas of Human Anatomy/Skeleton
- 12,G.J.Tortara Wiley India. Private Ltd.,New Delhi.Anatomy and Physiology
13. K.D.Chatterjee,K.D CBS Publishers & Distributors, Private Ltd.,New Delhi. Parasitology, Protozoology and Helminthology

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**Z-4003:Project/Dissertation .....continue (sem-3003)(60 hrs.)**

The learning objective of the paper will enrich the students with basic principle of research methodology which help the students to learn essential steps involved in research.

\*Project work should be done individually on any topic of importance related to the subject.

\* Project may be done in-house or at a recognized institution outside the campus as specified in the guidelines.

\* The concerned candidates have to submit their Project/Dissertation in a standard Hard-Bound thesis format.

\*The Thesis will be evaluated by an external examiner.

\*The Project/Dissertation must be presented in a Power-Point Presentation by the concerned candidates within 15 minutes during their Dissertation Viva

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**Z-4004:Seminar Presentation)(60 hrs. )**

1. Students have to individually deliver a seminar on the advance or novel topic other than that mentioned in the curriculum.

2. Topic should not be related to his/her dissertation.

3. Maximum number of presentation slide should not exceed 25.

4. A topic should be explained within 12 minutes, followed by counter questions from the examiners for 3 minutes.

5. Students have to submit one copy of colour printed handouts (4 slides /page) of his/her presentation to the examiner.

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## **QUESTIONNAIRE FOR REVIEW OF PAPER**

### **INTRODUCTION**

1. Is the information provided in the „Introduction“ section helps to understand the problem? 2. State the reasons for performing this study. 3. Define the objectives/hypothesis of the research.

### **METHODS**

4. Can you suggest other samples, if applicable, that can be taken for the prescribe study to get the similar results? 5. Find other methods, if applicable, that can be appropriately used to fulfill the aim of the study. 6. Have you understood the rationale for the selection of technique(s) /method(s) in the given study? 7. Can you suggest alternate technique(s) /method(s), if applicable, that can be use to perform same analysis with its pros and cons? 8. Has sufficient information been provided to carry out the experiment? Do you think of any further information? 9. Can you think of additional experiments for this paper?

### **RESULTS AND DISCUSSION**

10. Is all the essential data represented in form of figures and tables? 11. Is there any duplication/repetition of work in the form of tables or graphs? 12. What are the limitations of the study carried out?

### **GUIDELINES AND RULES FOR DISSERTATION**

#### **Standard Format / Style of Submission of Manuscripts**

Submission of all manuscripts/thesis should be in a single MS Word file strictly adhering to the following parameters:

1. Thesis is to be printed in Times New Roman typing. 2. Font size to be kept 12. 3. Line Spacing should be 1.5 4. Thesis should contain: a) Title page with the name(s) of the candidate, their Examination Seat Number, Name of the supervising teacher and the Name of the institute. b) Authentication certificate of the institute. c) Declaration d) Acknowledgement. e) Chapter wise Index with Sub-heads and page numbers. f) Introduction (Maximum 05 Page). g) Review of Literature. (Maximum 15 Page) h) Aim & Objectives i) Materials and Methods. j) Results and Discussion. k) Conclusion l) Future line of investigation m) Appendix n) References. 5. All tables, charts, images should be at their appropriate places.

Figures & Tables: Each figure/table Should be numbered, titled. The position of figure or table should be placed at an appropriate place within the article only.

Project may be carried out in-house, or the student, after due sanction from the supervising teacher and institute, can opt for pursuing dissertation at following recognized institutions or industries like: 1. Any UGC recognized University PG departments.

2. Any Agriculture University. 3. All National and State level research institute. 4. ISO or FDA/USFDA industry or research center having R & D and Q.C. facilities.

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