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:-

યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા હેઠળના તમામ શૈક્ષણિક વિભાગોના વડાશ્રીઓ અને યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૬–૨૭ થી અમલમાં આવનાર 2 Years PG - M.Sc. Zoology Sem.-1 & 2 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ પ્રાણીશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૦/૦૨/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૨ થી મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૪/૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૭ થી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૮/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંકઃ૦૫ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંકઃઓથો./પરિપત્ર/૧૩૬૨૦/૨૦૨૬
તા.૧૯/૦૬/૨૦૨૬

કુલસચિવ(ઇ.ચા.)

પ્રતિ,
(૧) યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા હેઠળના તમામ શૈક્ષણિક વિભાગોના વડાશ્રીઓ.
(૨) યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
... આપશ્રીના વિભાગ/કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
(૩) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
(૪) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Structure of Program – M. Sc. SEM – 1. – 2026….

Course Category	Course Code	Course Title	Mark sheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Makrs	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	ZO- 1001	Human Anatomy	Human Anatomy	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 1001	Practical in Human Anatomy	Practical in Human Anatomy	500 - 599	-	04	-	04	-	02	-	25	-	25	-	50
	ZO - 1002	Medical Zoology	Medical Zoology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 1002	Practical in Medical Zoology	Practical in Medical Zoology	500 - 599	-	04		04		02		25		25		50
	ZO – 1003	Endocrinology and Histology	Endocrinology and Histology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 1003	Practical in Endocrinology and Histology	Practical in Endocrinology and Histology	500 - 599	-	04	-	04	-	02	-	25	-	25	-	50
	ZO – 1004	Fisheries Integration with Bhartiya Knowledge System (BKS)	Fisheries Integration with Bhartiya Knowledge System (BKS)	500 - 599	04	-	02	-	04	-	50	-	50	-	100	-
MINOR ELECTIVE	ZO – 1005	*Fundamentals of Cyber Security	Fundamentals of Cyber Security	500 - 599	04	-	02	-	04	-	50	-	50	-	100	-
SEC – (ANY ONE)	ZO – 1006	*Research Methodology	Research Methodology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
		Instrumentation and Presentation of Scientific Data	Instrumentation and Presentation of Scientific Data													
		Biostatistics	Biostatistics													

*Research Methodology syllabus will prepare by Adhoc Board of Research Methodology of VNSGU, SURAT.

*Fundamentals of Cyber Security syllabus will prepare by Computer Faculty of VNSGU, SURAT.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Postgraduate Programme
In
Zoology

2 Years (Degree)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

PROGRAM TITLE

Name of Program	**M. Sc. Zoology**
Program Abbreviation	ZO: Major course
Duration	Two year
Eligibility Criteria	As per university norms
Pre-requisite	B.Sc. in Zoology
Medium of Instruction	English / Guajarati
Objective of Program	The objective of the M.Sc. Zoology program is to provide students with a comprehensive understanding of animal biology, including the structure, physiology, behavior, genetics, ecology, and evolution of diverse animal species. The program aims to develop both theoretical knowledge and practical skills, enabling students to analyze, observe, and experiment with biological systems effectively. It also seeks to cultivate scientific thinking, research aptitude, and environmental awareness, preparing graduates for careers in research, wildlife conservation, healthcare, biotechnology, education, and related fields, while fostering an appreciation for biodiversity and sustainable management of natural resources.
Program Outcome (PO)	**PO-01:** Scientific Knowledge & Conceptual Understanding: Develop a strong foundation in scientific principles, theories and concepts across disciplines, fostering interdisciplinary learning, advance knowledge and problem-solving abilities. **PO-02:** Analytical & Critical Thinking: Apply critical thinking and analytical reasoning to evaluate scientific data, hypotheses and real-world problems, leading to evidence-based conclusions. **PO-03:** Research & Inquiry-based Learning: Develop investigative skills through experimentation, data analysis and scientific inquiry to contribute to research and innovation. **PO-04:** Laboratory & Technical Skills: Gain hands-on experience with laboratory techniques, instrumentation and computational tools relevant to scientific research and industry applications. **PO-05:** Digital & Computational Literacy: Utilize digital tools, computational techniques and emerging technologies such as AI, bioinformatics and statistical modelling to enhance scientific learning and problem-solving. **PO-06:** Environmental & Societal Responsibility: Understand the role of science in addressing environmental, health and societal challenges, promoting sustainability and ethical responsibility. **PO-07:** Effective Communication & Collaboration: Develop proficiency in scientific communication, both written and oral, for effective dissemination of knowledge while collaborating in multidisciplinary teams. **PO-08:** Innovation & Entrepreneurship: Foster an entrepreneurial mind-set by applying scientific knowledge for innovation, technology development, and industry-oriented applications.

	Develop sustainable solutions to address real-world challenges in research and environmental management. **PO-09:** Lifelong Learning & Professional Growth: Cultivate curiosity and adaptability for continuous learning, equipping students for higher education, research, and professional careers. **PO-10:** Ethical Leadership & Value-based Education: Develop leadership qualities, ethical values, and a sense of responsibility in applying science for societal progress, aligning with Indian knowledge systems and global perspectives.
Program Specific Outcomes (PSO)	**PSO-1:** Recall the classification, morphology, and anatomy of different animal groups and Identify key concepts and terminology in zoology. **PSO-2**: Explain the structure and function of animal systems, such as nervous, circulatory, and digestive systems and Interpret zoological data and graphs related to animal populations and ecosystems. **PSO-3**: Apply zoological principles to understand animal behaviour, ecology, and evolution and Use zoological concepts to analyze real-world scenarios related to conservation, wildlife management, and animal welfare. **PSO-4:** Break down complex zoological concepts, such as animal development and physiology, into component parts and Evaluate zoological evidence to support a claim related to animal diversity, adaptation, and extinction. **PSO-5:** Design experiments to investigate zoological questions and hypotheses related to animal behavior, ecology, and evolution and Critique zoological research and methodologies related to animal conservation and management. **PSO-6:** Develop innovative solutions to zoological problems related to animal conservation, welfare, and management and Communicate zoological findings effectively through various media, such as research papers, presentations, and popular articles.
Mapping between Pos and PSOs **Convention used:** ✓✓✓Strong correlation ✓✓Moderate correlation ✓Slight correlation	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓	✓✓
PO2	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓
PO3	✓	✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓
PO4	✓✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓
PO5	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓
PO6	✓	✓✓	✓✓✓	✓✓	✓✓	✓✓✓
PO7	✓	✓✓	✓✓	✓✓	✓✓	✓✓✓
PO8	✓	✓	✓✓	✓✓	✓✓✓	✓✓✓
PO9	✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓✓
PO10	✓	✓✓	✓✓	✓✓	✓✓	✓✓✓

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**1**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZO-1001**					
Course Level	**500 – 599**					
Course Title	**Human Anatomy**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Explain anatomical terminology and structural organization of the animal body. CO2: Describe the components and functions of the skeletal system and types of joints. CO3: Identify types of muscles and relate their structure to function. CO4: Explain the structure and functioning of the heart and types of circulation. CO5: Illustrate the structure and functions of the brain, spinal cord, and cranial nerves. CO6: Describe the structure and functioning of sensory organs involved in coordination and perception.					
Course Content	**UNIT 1 : Structural Framework and Vital Systems (15 hrs)** 1.1 Introduction & Anatomical Terminology • Body planes, sections, cavities, anatomical positions, directional terms. 1.2 Skeletal System • Axial skeleton: skull, vertebral column, rib cage. • Appendicular skeleton: limb bones, girdles. • Joints (types, examples). 1.3 Circulatory System • Structure of heart • Pulmonary and systemic circulation. **UNIT 2 : Coordination and Integration (15 hrs)** 2.1 Nervous System • Brain: structure and function • Spinal cord: structure and functions. • Cranial nerves 2.2 Sensory Organs					

<table>
<tr><td></td><td>

Eye: structure and layers (cornea, lens, retina).
Ear: external, middle, inner ear; organ of Corti.
Olfactory system: nasal cavity, receptors.
Taste buds and gustatory system.

Skin: receptors for touch, pressure, pain, temperature
</td></tr>
<tr><td>Course Code</td><td>ZOP-1001</td></tr>
<tr><td>Course Title</td><td>Practical in Human Anatomy</td></tr>
<tr><td>Course practical content</td><td>
1. To study human anatomical positions, body planes, and body cavities using charts and models.
2. To identify and study bones of the axial skeleton and appendicular skeleton (skull, vertebral column, rib cage, limb bones).
3. To demonstrate and classify different types of joints with examples.
4. To study the external and internal structure of the human heart (model/specimen).
5. To demonstrate pulmonary and systemic circulation using flow charts and diagrams.
6. To study the structure of the human respiratory system using charts/models.
7. To study the divisions of the human brain using models/charts.
8. To prepare a chart showing 12 pairs of cranial nerves with functions.
9. To study the structure of the eye and ear (model/chart)
10. To observe and locate taste buds on tongue model/ chart.
</td></tr>
<tr><td>\Mapping between Cos and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Reference Books</td><td>
• B.D. Chaurasia – Human Anatomy (Vol. I–III). CBS Publishers
• A.K. Datta – Essentials of Human Anatomy (Vol. I–III). Current Books International.
• Vishram Singh – Textbook of Anatomy (Vol. I–III). Elsevier India.
• T.S. Ranganathan – A Textbook of Human Anatomy. S. Chand Publishing.
Rajesh Kaushal – Textbook of Anatomy. Jaypee Brothers.
• Inderbir Singh – Textbook of Human Neuroanatomy. Jaypee Brothers.
• Inderbir Singh – Textbook of Human Histology. Jaypee Brothers
• S.R. Ayengar – Human Anatomy & Physiology. Satya Prakashan.
• Inderbir Singh – Textbook of Human Anatomy with Colour Atlas. Jaypee Brothers.
• K. Sembulingam & Prema Sembulingam – Essentials of Medical Physiology. Jaypee Brothers.
</td></tr>
<tr><td>Teaching Methodology</td><td>Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation</td></tr>
<tr><td>Evaluation Method</td><td>Theory: Internal Assessment: 25 Marks + External Assessment: 25 Marks
Practical: Internal Assessment: 25 Marks + External Assessment: 25 Marks</td></tr>
</table>

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**1**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZO-1002**					
Course Level	**500 – 599**					
Course Title	**Medical Zoology**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Explain the basic concepts of epidemiology, transmission, and host-parasite interactions. CO2: Describe the characteristics, grading, staging, and biology of cancer. CO3: Identify nutritional deficiency diseases and their clinical features. CO4: Explain lifestyle-related diseases and their preventive measures. CO5: Describe common endocrine disorders, their causes, and clinical manifestations. CO6: Explain strategies for transmission prevention and control of infectious and non-infectious diseases.					
Course Content	**UNIT 1: Introduction to Infectious Diseases** 1.1 Concept of Epidemiology, Incidence, Prevalence, Virulence, Pathogenicity, Transmission, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis. 1.2 Cancer: Definitions, Nomenclature, characteristics of benign and malignant, grading and staging of cancer, biology of tumour growth, invasion and metastasis, carcinogens. **UNIT 2**: **Aetiology, Clinical Features, and Management of the Disorder** 2.1 Nutritional Deficiency Disorder Kwashiorkar, Marasmus, Beri-beri, Scurvy, Pellagra, Anaemia, Night blindness, Rickets, Osteoporosis, Atherosclerosis. 2.2 Lifestyle & Mental Health Disorders Obesity, Diabetes, Hypertension, Non-Alcoholic Fatty Liver Disease (NAFLD), Depression, Anxiety, Substance use disorders, Insomnia, sleep disorders.					
Course Code	**ZOP-1002**					
Course Title	**Practical in Medical Zoology**					

<table>
<tr><td>Course practical content</td><td>1. To study the different types of tumour
2. To study Kwashiorkar, Marasmus, Beri-beri, and Scurvy
3. To study Pellagra, Anaemia, and Night blindness
4. To study Rickets, Osteoporosis, and Atherosclerosis
5. To study Obesity, Diabetes, and Hypertension
6. To study Non-Alcoholic Fatty Liver, Depression and Anxiety
7. To study substance use disorders, Insomnia and sleep disorders.
8. Make a report on a field visit to a research institute/laboratory to study some of the pathological and diagnostic techniques.</td></tr>
<tr><td>Mapping between Cos and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
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<tr><td>CO4</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
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<tr><td>Reference Books</td><td>

Park, K. (2017) Textbook of Preventive and social medicine. 23rd Edition. B.B Publisher.
Robbins, Basic Pathology, 9th edition (2012), Kumar, Abbas, Fausto and Mitchell; Saunders Publication, ISBN-13: 978-1437717815.
Ramnik. Sood (2009) Medical Laboratory Technology Methods and Interpretations, 6 th edition; Jaypee Brothers Medical Publishers, ISBN-13: 978-8184484496.
Robbins and Cotran. Pathologic Basis of Disease, 8th edition (2009), Vinay Kumar, Abul. K. Abbas, Jon C. Aster, Nelson Fausto; Saunders Publishers, ISBN-13: 978 1416031215.
5. Arora, D.R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications
Textbook of Pathology by Harsh Mohan, 7th Edition, Jaypee Brothers Medical Publishers Pvt. Ltd, 2014
Concise Textbook of Pathology by Pilli, Ganga S. 1st Edition, CBS Publishers & Distributors Pvt. Ltd, India, 2021

</td></tr>
<tr><td>Teaching Methodology</td><td>Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation</td></tr>
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**1**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZO-1003**					
Course Level	**500 – 599**					
Course Title	**Endocrinology and Histology**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Explain the structure, function, and endocrine roles of secondary endocrine organs. CO2: Describe the endocrine regulation of energy, body weight, and food intake. CO3: Explain endocrine regulation of blood pressure and related hormonal systems. CO4: Identify the types, structure, and functions of epithelial and connective tissues. CO5: Describe the structure and functions of nerve and muscle tissues, including muscle contraction. CO6: Explain the histology and functions of major endocrine glands (pituitary, thyroid, parathyroid, adrenal).					
Course Content	**Unit-1: 1.1 Secondary Endocrine Organs** • The Endocrine Gut • The Endocrine Heart • Endocrine Functions of Bone **1.2 The Regulatory Role of the Endocrine System** ➢ The Endocrine Regulation of energy and body weight • Homeostatic Control of Food Intake • Hedonic Control of Food Intake • The Role of the Peripheral Hormones in the Control of Food Intake ➢ The Endocrine Regulation of Blood Pressure • Sympathetic-Adrenal System (SAS) • Renin-Angiotensin-Aldosterone System (RAAS) • Other endocrine factors influencing blood pressure **Unit-2: 2.1 Histology** ➢ Epithelial Tissue • Characteristic features of epithelial cells • Types of epithelial tissues ➢ Connective Tissue					

<table>
<tr><td></td><td>

Characteristic features of connective tissue
Types of connective tissue

➢ Muscle Tissue

Types of muscle tissue
Structure of skeletal muscle fibres

➢ Nerve Tissue

Structure of neurons
Types of neurons and glial cells

</td></tr>
<tr><td>Course Code</td><td>ZOP-1003</td></tr>
<tr><td>Course Title</td><td>Practical in Endocrinology and Histology</td></tr>
<tr><td>Course practical content</td><td>
1. To study the endocrine functions of gut, heart, and bone using charts/models.
2. To study the homeostatic control of food intake using charts and diagrams.
3. To study the hedonic control of food intake using charts and diagrams.
4. To study the role of peripheral hormones in the regulation of food intake using charts and diagrams.
5. To study the role of the Sympathetic–Adrenal System (SAS) in blood pressure regulation.
6. To study the Renin–Angiotensin–Aldosterone System (RAAS) using charts/models.
7. To study epithelial tissue and its types using permanent slides and charts.
8. To study connective tissue and its types using permanent slides and charts.
9. To study the types of muscle tissue and the structure of skeletal muscle fibres using permanent slides and charts.
10. To study the structure of neurons and glial cells using permanent slides and charts.
</td></tr>
<tr><td>Mapping between Cos and PSOs</td><td>
<table>
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<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
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<tr><td>CO4</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
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</td></tr>
<tr><td>Reference Books</td><td>

Principles of Endocrinology and Hormone Action – Edited by Antonino Belfiore & Derek LeRoith, Springer (Endocrinology Series, 2018).
Endocrinology and Reproductive Biology – S. C. Rastogi. New Age International, 2014.
Essentials of Endocrinology – C. C. Chatterjee. Academic Publishers, 2010.
Textbook of Endocrinology – K. N. Bhatia & V. K. Kapoor. Simplified Indian edition for UG students.
Textbook of Histology – N. N. Majumdar. Current Books International, Kolkata, 2016.
Textbook of Histology – W. F. Windle. McGraw-Hill, 1950.
Histology – R. O. Greep. McGraw-Hill, 1954.

</td></tr>
</table>

	• Basic Histology: Text and Atlas – L. C. Junqueira, J. Carneiro, & R. O. Kelley. 14th ed., McGraw-Hill, 2016. • Chatterjee, C. C. Essentials of Endocrinology. Academic Publishers, 2010. • Rastogi, S. C. Endocrinology and Reproductive Biology. New Age International, 2014. • Bhatia, K. N., & Kapoor, V. K. Textbook of Endocrinology. Simplified Indian edition. • Junqueira, L. C., Carneiro, J., & Kelley, R. O. Basic Histology: Text and Atlas. 14th ed., McGraw-Hill, 2016. • Majumdar, N. N. Textbook of Histology. Current Books International, Kolkata, 2016. • Greep, R. O. Histology. McGraw-Hill, 1954.
Teaching Methodology	Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation
Evaluation Method	Theory: Internal Assessment: 25 Marks + External Assessment: 25 Marks Practical: Internal Assessment: 25 Marks + External Assessment: 25 Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**				
Semester	**1**				
NCrF Credit Level	**6.0**				
Course Type	**Major**				
Course Subtype	**Nil**				
Subject Type	**Discipline Specific**				
Course Code	**ZO-1004**				
Course Level	**500 – 599**				
Course Title	**Fisheries Integration with Bhartiya Knowledge System (BKS)**				
Credit	**Theory:**	**04**	**----------**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**				
Course Outcomes	CO1: Understand basic aquaculture concepts, approaches, and techniques. CO2: Identify key fish species, farm structures, and culture equipment. CO3: Apply pond preparation, biosecurity, and harvesting practices. CO4: Explain ornamental fish groups and components of aquarium setups. CO5: Operate basic aquarium instruments and feeding methods. CO6: Evaluate fisheries management, production trends, and sustainability issues. CO7: Understand the fundamental principles of aquaculture and fisheries, and correlate them with traditional Indian knowledge systems.				
Course Content	**UNIT–1: Aquaculture – Core Concepts** • Overview of Aquaculture (Scope, brief history, present status.) • Main Aquaculture Approaches (Extensive, semi-intensive, intensive.) • Species & Farm Basics (Cultivable fish groups, basic pond/farm structure.) • Modern Techniques (Biofloc, RAS, cage culture, aquaponics.) • Traditional Indian fish culture practices described in ancient texts water resource management.Traditional ecological knowledge of seasonal breeding and lunar cycles influencing fish growth. **UNIT–2: Applied Food Fish Farming** • Culture Equipment (Aerators, pumps, biofilters, feeders, transport units.) • Pond Preparation (Drying, liming, manuring, water conditioning.) • Biosecurity Measures (Disinfection practices, predator/bird control.) • Sampling & Harvesting (Biomass check, grading, harvest & post-harvest handling.) • Use of organic manures (cow dung, plant residues) in traditional pond fertilization. • Indigenous disease management using herbal extracts like neem (Azadirachta indica) and turmeric. **UNIT–3: Ornamental Fish & Aquarium Science** • Ornamental Fish Groups (Habitat-based and feature-based categories.)				

<table>
<tr><td></td><td>

Aquarium Setup (Tank types, filtration units, lighting, water stability.)
Aquarium Instruments (Aerator, heater, filter, thermostat, illumination units.)
Feeding Types (Live, frozen, dry, sinking/floating feeds.)
Cultural significance of fish in Indian traditions (e.g., Matsya avatar of Lord Vishnu).
Use of natural decorative elements like stones, aquatic plants, and driftwood inspired by traditional aesthetics.
Traditional beliefs regarding fish keeping for prosperity and vastu balance.

UNIT–4: Fisheries Management & Sustainability

Economic Role of Fisheries (Nutrition, rural economy, trade contribution.)
Management & Governance (Regulations, licensing, mesh rules, co-management.)
Production Trends (Inland vs marine growth, global & Indian patterns.)
Sustainability Challenges (Climate impacts, biotechnology, ecosystem-based management.)
Traditional conservation practices
Sustainable fishing ethics rooted in Indian philosophy (Ahimsa and ecological balance).

</td></tr>
<tr><td>Mapping between Cos and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>CO4</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO7</td><td></td><td></td><td></td><td></td><td>✓</td><td></td></tr>
</table>
</td></tr>
<tr><td>Reference Books</td><td>

Aquaculture: Principles and Practices – T. V. R. Pillay & M. N. Kutty (Wiley-Blackwell)
Fish and Fisheries – B. N. Yadav (Daya Publishing)
Handbook of Fisheries and Aquaculture – ICAR, New Delhi
Textbook of Aquaculture Engineering – Odd-Ivar Lekang (Wiley)
Ornamental Fish Culture and Aquarium Management – R. P. Sinha & S. S. Sinha
Textbook of Fish Health – Edward Noga (Wiley-Blackwell)
Fish Diseases and Disorders (Vol. 1–3) – P. T. K. Woo (CABI)
Inland Fisheries of India – N. K. Chakraborty (Oxford & IBH)

</td></tr>
<tr><td>Teaching Methodology</td><td>Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation</td></tr>
<tr><td>Evaluation Method</td><td>Internal Assessment: 50 Marks
External Assessment: 50 Marks</td></tr>
</table>

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**I**					
NCrF Credit Level	**6.0**					
Course Type	**SEC**					
Course Subtype	**Employability / Skill Development**					
Subject Type	**Discipline Specific**					
Course Code	**ZO-1006**					
Course Level	**500-599**					
Course Title	**Instrumentation and Presentation of Scientific Data**					
Credit	**Theory:**	**02**	**Practical:**	**----**	**Total:**	**02**
Effective From	**Academic Year: 2026-2027**					
Course Outcomes	**CO1:** Select appropriate instruments for specific biological and analytical applications. **CO2:** Demonstrate basic operational knowledge and applications of common laboratory instruments used in life science research **CO3:** Prepare a scientific manuscript with effective components of a research paper, including organising and presenting scientific data **CO4:** Demonstrate scientific communication skills suitable for academic, research, and professional environments.					

Mapping between Cos and PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	✓		✓		
CO2		✓		✓	✓
CO3	✓		✓		✓
CO4		✓			✓

Course Content

UNIT 1: **Unit 1: Instrumentation**

1.1 Centrifugation: Principle, types and applications

1.2 Electrophoresis: Principle, Structural Components, Applications.

1.3 Chromatography: Principle, types and applications

1.4 Spectrophotometer: Principle, Applications

1.5 PH meter: Principle, Applications

1.6 Microscopy: Binocular Trinocular

Unit 2: Presentation of Scientific Data

	2.1 Types of presentation: Oral, Poster, Written, Audio-visual Aids for presentation 2.2 Preparing the manuscript: Guidelines for authors, The IMRAD format 2.3 Title, Byline, Abstract and Summary, Keywords 2.4 Presentation of Introduction, Materials and Methods, Results, Discussion, Conclusions and Significance in a research paper.
Reference Books	R.S. Khandpur (Tata McGraw-Hill) — detailed coverage of analytical instruments, including spectrophotometry, electrophoresis, chromatography, pH meters, etc. Bisen & Sharma-explains principles and applications of key bio-laboratory instruments (microscopy, pH meter, chromatography, electrophoresis, spectrophotometry) in life science research. Chatwal & Anand-widely recommended textbook for understanding principles, instrumentation and analysis techniques. Margaret Cargill & Patrick O'Connor - a practical guide to preparing manuscripts. Michael Alley — focuses on clear, effective scientific communication.
Teaching Methodology	Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation
Evaluation Method	Internal Assessment: 25 Marks External Assessment: 25 Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**I**					
NCrF Credit Level	**6.0**					
Course Type	**SEC**					
Course Subtype	**Employability / Skill Development**					
Subject Type	**Discipline Specific**					
Course Code	**ZO-1006**					
Course Level	**400-499**					
Course Title	**Biostatistics**					
Credit	**Theory:**	**02**	**Practical:**	**----**	**Total:**	**02**
Effective From	**Academic Year: 2026-2027**					

Course Outcomes

CO1: Explain the scope, importance, and applications of biostatistics in life sciences, including biodiversity and ecological studies.
CO2: Collect, classify, tabulate, and graphically represent biological data using appropriate sampling methods and data scales.
CO3: Compute and interpret descriptive statistical measures (mean, median, variance, standard deviation) and probability distributions (Normal, Binomial, Poisson) in biological contexts.
CO4: Analyze biodiversity and ecological datasets by calculating and interpreting diversity indices (Shannon–Wiener, Simpson, Margalef) to assess species richness and evenness.
CO5: Apply inferential statistical techniques (t-tests, ANOVA, Chi-square, correlation) to test biological hypotheses and draw valid conclusions from experimental data.
CO6: Interpret statistical outputs from software tools and evaluate regression models to explain biological relationships and support research-based decision making.

Mapping between COs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓		✓		
CO2		✓		✓	✓
CO3	✓		✓		✓
CO4		✓			✓
CO5		✓		✓	✓
CO6			✓	✓	✓

Course Content

UNIT 1:

- Introduction to Biostatistics: Scope and applications in life sciences

	• Data Collection & Presentation: Sampling methods (Random, Stratified, Cluster), Types of data scales, Tabulation and frequency distributions. • Descriptive Statistics: Measures of central tendency and dispersion; Graphical representation of biological data • Probability & Basic Distributions: Normal, Binomial, Poisson (biological relevance) • Biodiversity & Ecological Data Analysis: Species richness and evenness; Diversity indices: Shannon–Wiener, Simpson, Margalef, Interpretation of diversity indices in ecological and environmental studies **UNIT 2: Inferential Statistics & Modeling** • Statistical Inference: Hypothesis testing, confidence intervals; Type I and Type II errors • Parametric Tests: *t*-test (one-sample, independent, paired); One-way ANOVA • Non-parametric Tests: Chi-square test, correlation (Pearson & Spearman) • Regression Analysis: Simple linear regression and biological interpretation • Application of Statistical softwares in Research: Interpretation of results from life science and ecological studies
Reference Books	1. Biostatistics A Methodology for the Health Sciences – By GERALD VAN BELLE, LLOYD D. FISHER, PATRICK J. HEAGERTY, THOMAS LUMLEY, 2nd edition, 2004. 2. Introduction to Biostatistics (A Textbook of Biometry) - By Pranab Kumar Banerjee, 2004
Teaching Methodology	Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation
Evaluation Method	Internal Assessment: 25 Marks External Assessment: 25 Marks

Structure of Program – M. Sc. SEM – 2. – 2026…..

Course Category	Course Code	Course Title	Mark sheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Makrs	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	ZO – 2001	Animal Physiology	Animal Physiology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 2001	Practical in Animal Physiology	Practical in Animal Physiology	500 - 599	-	04	-	04	-	02	-	25	-	25	-	50
	ZO – 2002	Food Nutrition and Health	Food Nutrition and Health	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 2002	Practical in Food Nutrition and Health	Practical in Food Nutrition and Health	500 - 599	-	04		04		02		25		25		50
	ZO – 2003	Reproductive Biology and Immunology	Reproductive Biology and Immunology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 2003	Practical in Reproductive Biology and Immunology	Practical in Reproductive Biology and Immunology	500 - 599	-	04	-	04	-	02	-	25	-	25	-	50
	ZO – 2004	Dry and Wet Preservation and Taxidermy	Dry and Wet Preservation and Taxidermy	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-
	ZOP – 2004	Dry and Wet Preservation and Taxidermy	Dry and Wet Preservation and Taxidermy	500 - 599	-	04	-	04	-	02	-	25	-	25	-	50
MINOR ELECTIVE	ZO – 2005	*Entrepreneurship	Entrepreneurship	500 - 599	04	-	02	-	04	-	50	-	50	-	100	-
S E C	ZO – 2006	*Research Methodology	Research Methodology	500 - 599	02	-	01	-	02	-	25	-	25	-	50	-

*Research Methodology syllabus will prepare by Adhoc Board of Research Methodology of VNSGU, SURAT.

*Entrepreneurship syllabus will prepare by Commerce including B. A. Board of studies - VNSGU, SURAT.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Postgraduate Programme
In
Zoology

[1 Year (Degree)]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**2**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZO: 2001**					
Course Level	**500 – 599**					
Course Title	**Animal Physiology**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Describe the types, structure, location, and functions of epithelial tissues. CO2: Explain the types, structure, and functions of glands in the animal body. CO3: Discuss the structure, types, and functions of connective tissues excluding blood. CO4: Explain the structure, types, and mechanism of muscle contraction. CO5: Describe the structure and functions of the male and female human reproductive systems. CO6: Explain gametogenesis, fertilization, and the hormonal regulation of the menstrual cycle.					
Course Content	**Unit 1: Muscles** 1.1: introduction 1.2: general structure and types of muscles 1.3: mechanism of muscle contraction 1.4: chemical changes during muscle contraction 1.5: kymograph **Unit 2: Thermoregulation** 2.1: thermoregulation in animals. 2.2: tolerance to high temperature, cold and freezing, physiology of hibernation and aestivation. 2.3: osmo-ionic regulation in freshwater and marine fishes and crustaceans. 2.4: response to hyper and hypo-osmotic media. Adaptation to pressure in high altitude – buoyancy.					
Course Code	**ZOP: 2001**					

<table>
<tr><td>Course Title</td><td>Practical in Animal Physiology</td></tr>
<tr><td>Course practical content</td><td>1. Types of Muscles. (Slide/ photograph)
2. Sliding filament mechanism of muscle contraction. (Chart/ photograph)
3. Experiment with Kymograph. (Chart/ photograph)
4. Thermoregulatory adaptations in desert animals. (Chart/ photograph)
5. Thermoregulatory adaptations in birds. (Chart/ photograph)
6. Thermoregulatory adaptations in polar animals. (Chart/ photograph)
7. Effect of hypertonic and hypotonic solutions on RBCs (plasmolysis and hemolysis), performing
8. Osmoregulation in freshwater fishes; role of gills, kidneys, and salt glands. (Chart/ photograph)
9. Osmoregulation in marine fishes; role of gills, kidneys, and salt glands. (Chart/ photograph)</td></tr>
<tr><td>Mapping between Cos and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Reference Books</td><td>• Berry, A.K & K.Berry (2008) A text book of animal physiology, Emkay publications, New Delhi.
• Taylor DJ, Green NPO, Stout GW (2005). Biological Science. Cambridge University Press; 3 rd Edition.
• Enger E, Ross FC, Bailey D (2004). Concepts in Biology. McGraw-Hill Higher Education; 11th Edition.
• Campbell, N.A. and Reece J.B (2011). Biology. Pearson, Benjamin; 9th Edition ¬ Biology – XI and XII, NCERT, New Delhi
• S. S. Lal (2014) Vertebrate Practical Zoology, 11th revised Edition, Rastogi publ., Meerut.
• V.L. Sharma (2004) Practical Zoology, Paragon International, New Delhi.
• Berry, A.K & K.Berry (2008) A text book of animal physiology, Emkay publications, New Delhi.
• Randall, D., Burggren, W. & K. French (2002) Eckert Animal Physiology, W. H. Freeman and Company, New York.
• Singh, H. (2003) A text book of animal behaviour. Anmol Publications Pvt. Ltd. New Delhi.
• Moyes, C.D., P.M. Schulte (2016) Principles of Animal Physiology, Pearson Education India, 2nd Edition, India.</td></tr>
<tr><td>Teaching Methodology</td><td>Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation</td></tr>
<tr><td>Evaluation Method</td><td>Theory: Internal Assessment: 25 Marks + External Assessment: 25 Marks
Practical: Internal Assessment: 25 Marks + External Assessment: 25 Marks</td></tr>
<tr><td colspan="2">----------</td></tr>
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**2**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZOP: 2002**					
Course Level	**500 – 599**					
Course Title	**Food Nutrition and Health**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Explain the definition, functions, and classification of food and nutrients. CO2: Describe the sources, functions, and requirements of macronutrients and micronutrients. CO3: Explain the importance of water, balanced diet, and recommended daily allowances (RDAs). CO4: Analyze nutritional requirements based on age, sex, and basal metabolic rate (BMR). CO5: Identify health effects of excess or deficiency of nutrients, including lifestyle-related disorders. CO6: Explain food safety, hygiene, and the impact of processed and novel foods on health.					
Course Content	**Unit – 1: Food and Nutrition** 1.1 Definition and function of food. 1.2 Nutrition and nutrients: 1.) Definition, functions, sources of macronutrients (Protein, carbohydrates, lipids). 2.) Functions and dietary sources of micronutrients: (i) Vitamins: • Fat – soluble: Vit. A, D, E, K. • Water – soluble: Vit B complex (B1, B2, B3, B6, B12) and Vit C. (ii) Minerals: Calcium, Phosphorous, Iron, Iodine. 1.3 Water as a nutrient. 1.4 Balanced diet and its importance.					

	1.5 Guidelines for balanced diets, recommended daily allowances (RDAs) of nutrients. 1.6 Nutritional requirements according to age and sex. 1.7 BMR: Definition, factors affecting BMR and total energy requirements. **Unit – 2: Impact of food on health, food safety and hygiene.** 1.1 Excess of carbs in diet (Overweight, obesity) 1.2 Types of fiber and impact of fiber on digestive health. 1.3 Excess of lipids in diet (Heart diseases like Hypertension and atherosclerosis). 1.4 Eating disorders: Anorexia, bulimia, binge eating. 1.5 Food borne illnesses (Food poisoning by *Bacillus cereus*, *Clostridium*, *E.coli*, *Listeria*, *Salmonella*, *Staphylococcus*), safe food handling practices and importance of hygiene in preventing infections. 1.6 Health effects of processed foods and novel food technologies.
Course Code	**ZOP: 2002**
Course Title	**Practical in Food Nutrition and Health**
Course practical content	1. Study on the properties of proteins. 2. Determination of calcium content in food by titration. 3. Detection of Argemone oil in edible oil, Vanaspati in ghee/butter and Artificial colour & foreign matter in tea (dust/leaves). 4. To detect the presence of adulterants like water, urea, formalin, detergent, sugar and starch in milk; Metanil yellow in turmeric powder; brick powder in chili powder. 5. To detect the adulteration of insoluble substance, chalk powder and washing soda in sugar. 6. Calculation of BMR by Mifflin-St Jeor equation and total daily energy expenditure (TDEE). 7. Estimation of serum glucose with glucometer. 8. Detection of glucose in urine. 9. Aseptic handling: sources of contamination of foods. **10.** Different methods of food preservation – Drying, freezing, frying, canning, bottling etc.
Mapping between Cos and PSOs	
Reference Books	• Sunetra Roday (2017). Food Science and nutrition, Oxford University Press, ISBN – 13: 978-0-19-807886-9/ ISBN-10: 0-19-807886-2.

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	✓					
CO2	✓	✓		✓		
CO3		✓		✓		
CO4		✓		✓		
CO5		✓	✓	✓		
CO6		✓	✓	✓		✓

	• Revised short summary report 2024. ICMR-NIN expert group on Nutrient Requirements for Indians, Recommended Dietary Allowance (RDA) and Estimated Average Requirement (EAR) 2020. • Swaminathan M (2018). Handbook of Foods and nutrition. Published by: Ganesh and Co. Pvt. Ltd. Madras ISBN – 10: 812041795X / ISBN – 13: 978-8120417953. • Tejmeet Rekhi and Heena Yadav (2020). Fundamentals of Food and Nutrition. Elite Publishing House.
Teaching Methodology	Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation
Evaluation Method	Theory: Internal Assessment: 25 Marks + External Assessment: 25 Marks Practical: Internal Assessment: 25 Marks + External Assessment: 25 Marks

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**2**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Entrepreneurship / Employability / Skill Development (Specify the relevant Subtype or write "Nil" if not applicable.)**					
Subject Type	**Discipline Specific**					
Course Code	**ZO: 2003**					
Course Level	**500 – 599**					
Course Title	**Reproductive Biology and Immunology**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Describe different types of reproduction and explain the biological importance of reproductive processes. CO2: Explain gametogenesis, hormonal regulation, and reproductive cycles in humans and animals. CO3: Demonstrate understanding of reproductive health, modern contraceptive methods, and causes/diagnosis of infertility. CO4: Summarize various Assisted Reproductive Technologies (ART) such as IVF, ZIFT, GIFT, and ICSI. CO5: Identify the cells, organs, and components of the innate and adaptive immune systems, including immunoglobulin types and functions. CO6: Differentiate between types of immunity (innate/adaptive, active/passive) and describe immune dysfunctions and the role of MHC.					
Course Content	**UNIT 1: Reproductive Biology** **1.1: Fundamentals of Reproduction:** Types of reproduction, Significance of reproduction, Asexual reproduction: types (binary fission, budding, fragmentation, spores), Parthenogenesis, Sexual reproduction, Reproductive cycles, Gametogenesis, Steroidogenesis, Hormonal regulation of reproduction **1.2: Reproductive Health:** Modern contraceptive methods; Infertility in males and females- causes and diagnosis Assisted Reproductive Technologies (ART): sperm banks, IVF, frozen embryos, ET, EFT, IUT, ZIFT, GIFT, ICSI, **UNIT 2: Immunology** **2.1:** Introduction to the Immune System: Concept of Immunity, Cells and organs of the Immune system. Lymphoid Organs,					

<table>
<tr><td></td><td>2.2: Innate and Adaptive Immunity: Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral), Passive: Artificial and natural Immunity, Active: Artificial and natural Immunity, Immune dysfunctions, MHC, Immunoglobulins: Structure and functions of different classes of immunoglobulins</td></tr>
<tr><td>Course Code</td><td>ZOP: 2003</td></tr>
<tr><td>Course Title</td><td>Practical in Reproductive Biology and Immunology</td></tr>
<tr><td>Course practical content</td><td>1 Study of histological sections from photomicrographs/ permanent slides of testis, epididymis and accessory glands of male reproductive systems; sections of ovary, uterus of female reproductive system
2 Study of reproductive cycle: Estrous cycle
3 Study of reproductive cycle: Menstrual cycle
4 Study of reproductive hormones.
5 Study of modern contraceptive devices.
6 Study of Assisted Reproductive Technologies (ART) through videos.
7 Study of primary and secondary lymphoid organs.
8 Histological study of spleen, thymus and lymph nodes through slides/ photographs
9 To study structure of different types of antibodies.
10 To study principle of agglutination and perform an agglutination test using known antigen and antibodies.</td></tr>
<tr><td>Mapping between Cos and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO6</td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
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</td></tr>
<tr><td>Reference Books</td><td>
Austin, C.R. and Short R.V. (Eds) (2012) Reproduction in Mammals. Cambridge University Press.
P.S. Verma & V.K. Agarwal. Reproductive Biology. S. Chand Publications
Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2017). Immunology, VI Edition. W.H. Freeman and Company.
Abbas K. Abul and Lechtman H. Andrew (2017) Cellular and Molecular Immunology. V Edition. Saunders Publication.
Peter J. Delves and Seamus J. Martin (2017) Roitt′s Essential Immunology, Wiley-Blackwell; 13th edition.
R. Ananthanarayan & C.K. Jayaram Panicker (Immunology section in Microbiology textbook) Basic Immunology. Universities Press / Orient Blackswan
Practical Zoology: Vertebrate. P.S. Verma & V.K. Agarwal. S. Chand & Company
Manual of Practical Zoology. S. Shukla & P. Verma. Rastogi Publications.
</td></tr>
<tr><td>Teaching Methodology</td><td>Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation</td></tr>
<tr><td>Evaluation Method</td><td>Theory: Internal Assessment: 25 Marks + External Assessment: 25 Marks
Practical: Internal Assessment: 25 Marks + External Assessment: 25 Marks</td></tr>
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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

SYLLABUS

Program Name	**M. Sc. Zoology**					
Semester	**2**					
NCrF Credit Level	**6.0**					
Course Type	**Major**					
Course Subtype	**Nil**					
Subject Type	**Discipline Specific**					
Course Code	**ZO: 2004**					
Course Level	**500 – 599**					
Course Title	**Wildlife Biology**					
Credit	**Theory:**	**02**	**Practical:**	**02**	**Total:**	**04**
Effective Form	**Academic Year: 2026-2027**					
Course Outcomes	CO1: Understand basic concepts, scope, and principles of wildlife management. CO2: Explain population ecology, species management, and wildlife monitoring methods. CO3: Describe protected area categories, conservation techniques, and zoo management. CO4: Understand wildlife laws, national/international agencies, and conflict mitigation.					
Course Content	**Unit 1 Introduction to Wildlife Management** 1.1: Definition, concepts, and scope 1.2: Principles and practices of wildlife management 1.3: Forest and wildlife administration in India **Unit 2 (A) Population Ecology & Species Management** 1.1: Population estimation, dynamics, and regulation 1.2: Capture techniques, handling, restraint and tagging 1.3: Bio-telemetry, radio-tracking, reintroduction of species 1.4: Predator–prey relationships 1.5: Species-specific management (lion, elephant, rhino, deer, crocodile, etc.)					
Course Code	**ZOP: 2004**					
Course Title	**Practical in Wildlife Biology**					
Course practical content	1. To understand the basic concepts, scope, and administrative framework of wildlife management in India. 2. To estimate wildlife population using indirect methods. 3. To understand safe wildlife capture and marking methods. 4. To study tracking of wildlife using telemetry tools. 5. To analyze predator–prey dynamics and species-specific management strategies. 6. To study and compare management practices for different wildlife species based on their ecological and biological requirements.					

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	✓	✓		✓		
CO2	✓	✓	✓	✓		
CO3		✓	✓	✓		
CO4	✓	✓		✓		

Reference Books	• Das, J.W., et al. (1981). ***Infectious Diseases of Wild Mammals.*** **Iowa State University Press.** • International Zoo Yearbook. **New York Zoological Society.** • Price & Davis (1975). ***Introduction to Behavioral Ecology.*** **Oxford University Press.** • Lever, C. (1985). ***Naturalized Mammals of the World.*** **Wiley, London.** • Khan, J.A. (2006). ***Conservation of Wildlife Populations: Biology, Genetics and Management.*** **Wiley-Blackwell.** • Rai, S. (1995). ***Fundamentals of Wildlife Management.*** **Justice Home, Allahabad.** • Sankar & Mohan (2004). ***Captive Wildlife Management.*** **Wildlife Institute of India, Dehradun.** • Groombridge, B. (1981). ***Wildlife Conservation and Modern Zoo.*** **Saiga Publishing Co., England.** • Zoo Outreach Organization Publications**, Coimbatore.** • Government of India (1972). ***The Wildlife (Protection) Act.***
Teaching Methodology	Class work, Discussion, Self-Study, Projects, Seminars or / and Assignment, Slides/Photomicrographs/Videos, Laboratory work. Journal Preparation
Evaluation Method	Internal Assessment: 50 Marks External Assessment: 50 Marks