M. G. SCIENCE INSTITUTE, AHMEDABAD (AUTONOMOUS)
B.Sc. SEMESTER – II
Detailed syllabus for each course

Semester: II	**Course No.:**	**Course Code:** DSC-C- ZOO-121 (T) **Course Title:-** Animal diversity, physiology and cytology
Credits:04		**Course Category:** Major

Course Outcomes: On successful completion of the course, the learner will be able to:

CO #	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall the concept of Zoological classification. Students will gain fundamental knowledge of animal Systematics.
CO 2	Understanding	On completion of the course students will be able to understand general taxonomic rules of animal classification. Students will be able to understand and classifying the invertebrate animals and this will help them to understand diversity also.
CO 3	Applying	Students will be able to visualize anatomical features of invertebrates by studying representative type. This will be helpful to understand body organization of other animals also.
CO 4	Remembering and Applying	Students will develop understanding of basic concepts of physiology. They will also being able to know the anatomical structure of organs and their significance in physiological functions.
CO 5	Applying	Students will develop understanding of basic concepts of microscopy, staining of tissues, cell organelles. This understanding helps them to acquire and demonstrate proficiency in using modern techniques and tools relevant to zoological research including microscopy and cell biology. etc.
CO 6	Creating	These outcomes aim to prepare graduates for diverse career opportunities in fields such as research education as well as physiological and cytological studies.

Unit No.	Unit Contents	Sessions Allotted
1	**Animal diversity (Non-chordates) Systematics:** ... General characters, salient features and classification of Invertebrates, starting from kingdom up to class, giving reasons & suitable examples (as per practical syllabus): ▪ Porifera ▪ Coelenterata ▪ Platyhelminthes ▪ Aschelminthes	15

2	**Animal diversity (Non-chordates):** **General topics**: ... Spicules in porifera ... Polymorphism in Coelenterata (Hydrozoa) ... Types of coral reefs **Type study: Hydra (*Hydra vulgaris*):** ... Systematic position ... Habits and habitat ... External Morphology ... Internal structure (Coelenteron, Body wall) ... Locomotion ... Nutrition ... Respiration ... Nervous system ... Reproduction (Asexual & Sexual) and Regeneration	15
3	**Animal Physiology – Human Urinary System** **Anatomy and Histology of the Urinary system** ... External and Internal anatomy of the kidneys ... Blood supply to kidneys ... Overview of kidney functions ... The Nephron (Structure and Histology) **Renal Physiology** ... Glomerular filtration ... Tubular reabsorption ... Tubular secretion- Counter current mechanism ... Micturition reflex ... Hormonal regulation in brief (Name of the hormones and their function only) **Urinary diseases in brief:** ... Renal stones ... Renal failure ... Urinary tract infection ... Bladder infection ... Dialysis	15
4	**Cytology** ... Microscopy – Simple light microscope Compound light microscope (Components and working mechanism) ... Classification of chromosomes: ▪ Based on the location of centromere	15

	▪ Based on their functions (i.e. somatic & sex chromosomes) ▪ Ultra structure & general functions of Metaphase Chromosome Chromatin, Chromatids, Nucleosome, Centromere, Kinetochore, Telomere, Primary and secondary constriction, Euchromatin, Heterochromatin ... Cell cycle (Mitotic) ... Mitosis ... Meiosis	

References:

1. Dhami PS, Dhami JK: Textbook of Invertebrates, 5th ed. New Delhi (DL): S. Chand & Company; 2021
2. George Howard Bell, Donald Emslie-Smith, Colin Ralston Paterson: Textbook of Physiology, 10th illustrated ed.; Churchill Livingstone, 2008
3. John EH, Michael EH: Guyton and Hall Textbook of medical physiology, 14th ed.; Elsevier Pub, 2020
4. Kotpal RL: Textbook of Invertebrates and vertebrates. 12th ed. Meerut (UP): Rastogi Publishers; 2020.
5. Power CB: Cell Biology, 3rd ed. Maharashtra (MH) C. B. Power, Himalaya Publishing House, Maharashtra, 2019
6. Pranab D: Diagnostic Cytology, 3rd ed. New Delhi (DL); Jaypee brothers' medical publishers, 2022
7. Tortora GJ, Brayn D: Principal of Anatomy and Physiology, Global ed.Wiley Pub., 2017
8. Verma PS, Agarval VK: Cytology, Revised ed. Delhi (DL); S. Chand & Co., 1999
9. Wallace AF, Dyson RH: Principles of Animal Taxonomy, George Gaylord Simpson. Columbia University Press, 1961

Semester: II	**Course No.:**	**Course Code:** DSC-C- ZOO-122 (P) **Course Title:-** Animal diversity, physiology and cytology
Credits:04		**Course Category:** Major

Course Outcomes: On successful completion of the course, the learner will be able to:

CO #	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Identify and recall the characteristics of various animal specimens.
CO 2	Understanding	Explain the key features that distinguish different animal phyla and classes.
CO 3	Applying	Use taxonomic keys to classify and identify unknown organisms. Compare and contrast the morphological features used in taxonomic identification.
CO 4	Remembering and Applying	Students will develop understanding of basic concepts of physiology. They will also being able to know the anatomical structure of organs and their significance in physiological functions.
CO 5	Applying	Students will develop understanding of basic concepts of microscopy, staining of tissues, cell organelles. This understanding helps them to acquire and demonstrate proficiency in using modern techniques and tools relevant to zoological research including microscopy, and cell biology. etc.
CO 6	Creating	These outcomes aim to prepare graduates for diverse career opportunities in fields such as research education and physiological and cytological studies.

Unit No.	Unit Contents	Sessions Allotted
1	**Animal diversity (Nonchordates) – Systematics** (A) Identification & classification of invertebrates (Kingdom to Class) Porifera : Leucosolenia, Euspongia, Hylonema Coelenterata : Hydra, Physalia, Aurelia, Sea anemone, Coral. Platyhelminthes : Planaria, Liverfluke, Tapeworm. Nemathelminthes : Enterobius, Ascaris, Rhabditis (B) Temporary mounting/slide of Spicules (Porifera)	15
2	**Animal diversity (Non-chordates): Type study** **Study of Hydra (*Hydra vulgaris*) - by Slides / Charts / Video / Photographs:** ... W. M. Hydra, Hydra with bud, Hydra with gonads, T. S. Hydra, L. S. Hydra, T. S. of Hydra passing through testis, T. S.	15

	of Hydra passing through ovary ... Types of coral reefs	
3	**Animal Physiology – Human Urinary System** **(A) Histology of urinary system: (Charts / Photographs)** ... Frontal Section of kidney ... Renal corpuscle (Internal view) ... Cortical and Juxtamedullary nephron ... Blood supply to kidney **(B) Analysis of normal and abnormal constituents of urine:** ... Physical analysis: Colour, Odour, Specific gravity (Urinometer), pH ... Chemical analysis: Sugar, Protein, Bile Salts, Ketones, Urea, Creatinine ... Microscopies (Photographs): Blood corpuscles, epithelial cells, phosphate crystals	15
4	**Cytology** ... Simple light microscope, Compound light microscope ... Ultra structure of Metaphase Chromosome ... Mitosis – Onion root tip (Squash method) ... Meiosis (Through permanent slides) ... Cell cycle ... Barr body	15

Semester: II	**Course No.:**	**Course Code:** DSC-M-ZOO-123 (T) **Course Title:-** Animal diversity and type study (non-chordates)
Credits:02		**Course Category:** Minor

Course Outcomes: On successful completion of the course, the learner will be able to

CO #	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall the concept of Zoology. Students will gain fundamental knowledge of animal Systematics.
CO 2	Understanding	On completion of the course students will be able to understand general taxonomic rules of animal classification. Students will be able to understand and classifying the invertebrate animals by applying taxonomic rules. This will help them to understand diversity also.
CO 3	Remembering and Applying	Students will develop the skill of understanding various biological systems of organisms and inn a much better way.
CO 4	Creating	These outcomes will help to prepare graduates for diverse career opportunities in Fields such as environmental management, and field of research Education.

Unit No.	Unit Contents	Sessions Allotted
1	**Animal diversity (Non-chordates) – Systematics:** ... General characters, salient features and classification of Invertebrates, starting from kingdom up to class, giving reasons & suitable examples (as per practical syllabus): ▪ Porifera ▪ Coelenterata ▪ Platyhelminthes ▪ Aschelminthes	15
2	**Animal diversity (Non-chordates):** **General topics**: ... Spicules in porifera ... Polymorphism in Coelenterata (Hydrozoa) ... Types of coral reefs **Type study: Hydra (*Hydra vulgaris*):** ... Systematic position ... Habits and habitat ... External Morphology	15

	... Internal structure (Coelenteron, Body wall) ... Locomotion ... Nutrition ... Respiration ... Nervous system ... Reproduction (Asexual & Sexual) and Regeneration	

Semester: II	**Course No.:**	**Course Code:** DSC-M-ZOO-123 (P) **Course Title:-** Animal diversity and type study (non-chordates)
Credits:02		**Course Category:** Minor

Course Outcomes: On successful completion of the course, the learner will be able to

CO #	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall the concept of Zoology. Students will gain fundamental knowledge of animal Systematics.
CO 2	Understanding	On completion of the course students will be able to understand general taxonomic rules of animal classification. Students will be able to understand and classifying the invertebrate animals by applying taxonomic rules. This will help them to understand diversity also.
CO 3	Remembering and Applying	Students will develop the skill of understanding various biological systems of organisms and inn a much better way.
CO 4	Creating	These outcomes will help to prepare graduates for diverse career opportunities in Fields such as environmental management, and field of research Education.

Unit No.	Unit Contents	Sessions Allotted
1	**Animal diversity (Nonchordates) – Systematics:** (A) Identification & classification of invertebrates (Kingdom to Class) ... Porifera : Leucosolenia, Euspongia, Hylonema ... Coelenterata : Hydra, Physalia, Aurelia, Sea anemone, Coral. ... Platyhelminthes : Planaria, Liverfluke, Tapeworm. ... Nemathelminthes : Enterobius, Ascaris, Rhabditis (B) Temporary mounting/slide of Spicules (Porifera)	15
2	**Animal diversity (Non-chordates): Type study** **Study of Hydra (*Hydra vulgaris*) - by Slides / Charts / Video / Photographs:** ... W. M. Hydra ... Hydra with bud ... Hydra with gonads ... T. S. Hydra ... L. S. Hydra ... T. S. of Hydra passing through testis ... T. S. of Hydra passing through ovary ... Types of coral reefs	15

References:

1. Dhami PS, Dhami JK: Textbook of Invertebrates, 5th ed. New Delhi (DL): S. Chand & Company; 2021
2. Kotpal RL: Textbook of Invertebrates and vertebrates. 12th ed. Meerut (UP): Rastogi Publishers; 2020.
3. Wallace AF, Dyson RH: Principles of Animal Taxonomy, George Gaylord Simpson. Columbia University Press, 1961
4. Kumar P, Mina Usha: Life Sciences: Fundamental and practices, 6th ed. Haryana (India); Pathfinder Publications, 2016

Semester: II	**Course No.:**	**Course Code:** MDC-ZOO- 124 (T) **Course Title:-** Introduction to some diseases and dietary disorders
Credits:02		**Course Category:** Multidisciplinary /Interdisciplinary

CO	Cognitive Abilities	Course Outcomes
CO 1	Remembering	To provide an overview of the common diseases affecting human health.
CO 2	Understanding	Describe the various causes and risk factors associated with the development of diseases.
CO 3	Applying	Analyze real-world case studies related to diseases and dietary disorders.
CO 4	Remembering and Applying	Explain how dietary habits and lifestyle choices influence the development of dietary disorders. Assess the impact of long-term dietary habits on overall health.
CO 5	Applying	Investigate the relationship between specific dietary imbalances and associated health issues.

Unit No.	Unit Contents	Sessions Allotted
1	**Introduction to some diseases** Causes, mode of transmission, symptoms and prophylaxis of the following: ... Covid-19 ... Dengue ... Rabies ... Measles ... Malaria ... Diarrhea	15
2	**Dietary disorders** Causes, symptoms and prevention: ... Malnutrition ... Anemia ... Dietetics: ▪ Balanced diet ▪ Obesity and its implications. ▪ Hazards of junk food.	15

Semester: II	**Course No.:**	**Course Code:** MDC-ZOO- 124 (P) **Course Title:-** Introduction to some diseases and dietary disorders
Credits:02		**Course Category:** Multidisciplinary /Interdisciplinary

CO	Cognitive Abilities	Course Outcomes
CO 1	Remembering	To provide an overview of the common diseases affecting human health.
CO 2	Understanding	Describe the various causes and risk factors associated with the development of diseases.
CO 3	Applying	Analyze real-world case studies related to diseases and dietary disorders.
CO 4	Remembering and Applying	Explain how dietary habits and lifestyle choices influence the development of dietary disorders. Assess the impact of long-term dietary habits on overall health.
CO 5	Applying	Investigate the relationship between specific dietary imbalances and associated health issues.

Unit No.	Unit Contents	Sessions Allotted
1	**Introduction to some diseases** Study through chart/model ... Covid-19 ... Dengue ... Rabies ... Measles ... Malaria ... Diarrhea	15
2	**Dietary disorders** Study through chart/model ... Malnutrition ... Anemia ... Dietetics: - Balanced diet - Obesity and its implications. - Hazards of junk food.	15

References:-

1. Text book of Zoology-Hyman series McGraw Hills.
2. Text-book of Zoology-Parker and Haswell Vol. I. Mac Millan & Co. 1986, New York.
3. Parasitic protozoa-Baker. Allen & Unwin, Inc. USA.
4. Medical Parasitology- K. D. Charterjee
5. Economic zoology by Shukla & Upadhaya
6. Economic zoology by Vishaw Premi
7. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwell
8. Mosquito (2000) Chandra G, Sribhumi Publication Co. Kolkata Medical Entomology, Hati A. K Allied Book Agency, Kolkata.

Semester: II	Course No.:	**Course Code:** SEC-ZOO-126 (T+P) **Course Title:** - Home aquarium management
Credits:02		**Course Category:** Skill enhancement course

Course Outcomes: On successful completion of the course, the learner will be able to:

CO #	Cognitive Abilities	Course Outcomes
CO 1	Remembering	Recall and understand the basic principles of maintaining a balanced aquarium ecosystem. Memorize and identify common aquarium fish species and aquatic plants.
CO 2	Understanding	Explain the characteristics, habitat requirements, and behavior of different fish and plants.
CO 3	Applying	Apply knowledge and skill to establish home aquarium. Identify common diseases and health issues in aquarium fish.
CO 4	Remembering and Applying	Demonstrate the ability to set up a functioning aquarium, including substrate placement, decoration, and water circulation.
CO 5	Creating	Create scope for entrepreneurship, self employment. Share knowledge with others through educational materials or presentations.

Unit No.	Unit Contents	Sessions Allotted
1	**(A): Aquarium tank and setting** ... Equipments and requirements for home aquarium ... Types and selection of tank ... Tank setting and position ... Aquascaping ... Precautions for an ideal aquarium **(B) Aquarium fishes** ... Characters of Aquarium fishes ... Community Aquarium fishes ... Ornamental fishes **(C) Aquarium plants** ... Introduction to Aquarium plants ... Importance of Aquarium plants ... Types of Aquarium plants ... Arrangement of Aquarium plants **(D) Aquarium Fish Diseases** ...Common aquarium fish diseases- Causes, symptoms and treatment ▪ Bacterial disease- Dropsy ▪ Fungal disease- Branchiomycosis ▪ Viral diseases -Viral Haemorrhagic Septicaemia (VHS), ▪ Parasitic diseases -Velvet disease **(E) Aquarium fish food** ...Prepared food ...Live food	15

2	**Practicals:** **(A): Aquarium tank and setting** Equipments and requirements for home aquarium, Types and selection of tank, Tank setting and position ,Aquascaping **(B) Aquarium fishes** Characters of Aquarium fishes , Community Aquarium fishes ,Ornamental fishes **(C) Aquarium plants** Introduction to Aquarium plants , Importance of Aquarium plants, Types of Aquarium plants Arrangement of Aquarium plants **(D)Aquarium fish diseases** ...Common aquarium fish diseases- Cause, symptoms and treatment ▪ Bacterial disease- Dropsy ▪ Fungal disease- Branchiomycosis ▪ Viral diseases -Viral Haemorrhagic Septicaemia (VHS), ▪ Parasitic diseases -Velvet disease **(E) Aquarium fish food** ...Prepared food ...Live food **(F) Visit to nearby Aquarium**	15

References:

1. Ornamental Aquarium Fish of India by Tekriwal, Kishori Lal; Rao, Andrew Arunava; Dawes, John.
2. Aquarium Management by Amit Saxena.
3. Indian Ornamental Fishes by Heiko Bleher by BNHS.
4. Fresh Water Fish Disease in Uttarakhand by Rakesh Verma and Sharma Priyanka.
5. Textbook of Vertebrate by S. S. Lal