

Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE
OF ARTS, SCIENCE & COMMERCE, BARAMATI.
(AUTONOMOUS INSTITUTE)



तुळजाराम चतुरचंद महाविद्यालय बारामती

GRADUATE DEPARTMENT OF ZOOLOGY
SYLLABUS

F. Y. B. Sc. Zoology Part-I,
SEMESTER-I
ACADEMIC YEAR 2022-2023

**Anekant Education Society's
TULJARAM CHATURCHAND COLLEGE
OF ARTS, SCIENCE & COMMERCE, BARAMATI.
AUTONOMOUS**

**Scheme of Course Structure (CBCS) Faculty of Science
Department of Zoology**

SEMESTER-I

Class: F.Y.B.Sc.

Pattern: 40 (IA) + 60 (EA)

Semester	Course Code	Title of Course	No. of Credits
Semester I	USZL111	Animal Systematics and Diversity - I	2
	USZL112	Fundamentals of Cell Biology	2
	USZL113	Zoology Practical-I	2
Semester II	USZL121	Animal Systematics and Diversity - II	2
	USZL122	Genetics	2
	USZL123	Zoology Practical-II	2

I A* - Internal Assessment

E A*- External Assessment

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester – I)

Course Code: USZL111

Course: I

Title of Course: Animal Systematics and Diversity – I

Credit: 2

No. of Lectures: 30

Learning Objectives:-

- Apply the Three Domain & Six Kingdom system to accurately classify diverse animal forms, distinguishing invertebrates from other life forms.
- Explain the importance of animal classification in organizing biological knowledge, facilitating research, and understanding evolutionary relationships.
- Master the Linnaean hierarchy classification system, confidently identifying phyla, classes, orders, families, genera, and species of animals.
- Differentiate between taxonomy and systematics, comprehending basic taxonomic terminology and the levels of alpha, beta, and gamma taxonomy.
- Evaluate the applications of biochemical and molecular methods in contemporary taxonomic research, understanding their advantages and limitations.
- Classify major invertebrate phyla like Protozoa, Porifera, Cnidaria, Platyhelminthes, Aschelminthes, and Annelida based on their salient features and representative examples.
- Analyze the evolutionary trends and adaptations observed within major invertebrate groups, drawing connections between classification and organismal characteristics.

Learning Outcomes:-

Student will be able to-

- CO1: Precisely categorize diverse animal forms using the Three Domain & Six Kingdom system, readily distinguishing invertebrates from other life domains and kingdoms.
- CO2: Articulate the crucial role of animal classification in organizing biological knowledge, enhancing research, and unveiling evolutionary relationships among animal groups.
- CO3: Fluently navigate the Linnaean hierarchy, flawlessly identifying and classifying animals at all taxonomic ranks (phyla, classes, orders, families, genera, and species).
- CO4: Clearly differentiate between taxonomy and systematics, demonstrating comprehension of basic taxonomic terminology and confidently apply alpha, beta, and gamma levels of taxonomy.
- CO5: Critically evaluate the applications and limitations of biochemical and molecular techniques in modern taxonomic research, providing evidence-based arguments for their use.
- CO6: Master the classification of major invertebrate phyla (Protozoa, Porifera, Cnidaria, Platyhelminthes, Aschelminthes, and Annelida) by confidently identifying and describing their distinct features and readily citing representative examples.
- CO7: Analyze evolutionary trends and adaptations within major invertebrate groups, establishing a strong connection between classification and the diverse characteristics observed across these animals.

Course Articulation Matrix of USZL111: Animal Systematics & Diversity-I

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	2	2	1	1	1	3
CO2	3	2	3	2	2	2	3	3	2
CO3	3	3	1	2	1	1	1	1	2
CO4	3	3	1	3	1	1	1	1	2
CO5	3	3	1	2	1	1	1	1	2
CO6	3	3	1	2	1	1	1	1	2
CO7	2	2	2	2	3	2	2	2	3

PO1: Disciplinary Knowledge

All Course Outcomes are mapped to PO1 because the primary goal of the course is to impart disciplinary knowledge in the field of animal classification. Each CO contributes directly to the acquisition of knowledge about classification systems, Linnaean hierarchy, taxonomic methods, and specific animal classes.

PO2: Critical Thinking and Problem Solving

Every CO involves critical thinking and problem-solving skills. Understanding classification systems, appreciating the significance of animal classification, mastering Linnaean hierarchy, developing taxonomic proficiency, and acquiring classification skills all necessitate the application of critical thinking and problem-solving abilities.

PO3: Social Competence

The course primarily focuses on the biological and scientific aspects of animal classification rather than extensive social aspects. While appreciation for the significance of animal classification has some social relevance, the direct emphasis on social competence is limited in this context.

PO4: Research-related skills and Scientific temper

Proficiency in taxonomic methods (CO4) explicitly involves research-related skills. Mastery of Linnaean hierarchy (CO3) and classification skills (CO5) also contribute to developing a scientific temper by promoting systematic and evidence-based approaches to understanding and categorizing the animal kingdom.

PO5: Trans-disciplinary knowledge

The integrated understanding through type study (CO7) is mapped to trans-disciplinary knowledge as it requires combining knowledge from various disciplines. While other COs are more focused on biological aspects, the integrated understanding component involves a broader, trans-disciplinary approach.

PO6: Personal and professional competence

While some aspects of personal and professional competence are indirectly addressed (e.g., critical thinking and problem-solving), the course does not explicitly focus on personal and professional competence. Therefore, the mapping is partial.

PO7: Effective Citizenship and Ethics

Similar to personal and professional competence, the course does not directly address effective citizenship and ethics. While an appreciation for the significance of animal classification touches upon ethical considerations, the emphasis is not sufficient for a strong mapping.

PO8: Environment and Sustainability

The course does touch upon environmental and sustainability aspects through the appreciation of the significance of animal classification. However, the depth of coverage is not extensive, leading to a partial mapping.

PO9: Self-directed and Life-long learning

Comprehensive understanding of classification systems (CO1) directly contributes to the development of skills necessary for self-directed and life-long learning. The course aims to equip students with the ability to continue learning beyond the classroom setting, particularly in the rapidly evolving field of taxonomy.

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester – I)

Course Code: USZL112

Course: II

Title of Course: FUNDAMENTALS OF CELL BIOLOGY

Credit: 2

No. of Lectures: 30

Learning Objectives:-

- Define and differentiate the core concepts of cell biology.
- Master the structure and functions of the cell membrane.
- Understand the organization and properties of the cytoplasm.
- Identify and explain the functions of major cell organelles.
- Appreciate the role and structure of the nucleus and its components.
- Understand the mechanisms and significance of cell division.
- Appreciate the practical applications of cytological techniques in cell biology.

Learning Outcomes:-

Student will be able to-

CO1: Develop a comprehensive understanding of cell biology, including historical perspectives, fundamental theories, and the interdisciplinary nature of the field.

CO2: Critically compare and contrast prokaryotic and eukaryotic cells, as well as plant and animal cells, evaluating size, shape, volume, number, and overall structure.

CO3: Demonstrate a mastery of cell membrane concepts, including its chemical composition, fluid mosaic model, and various functions crucial for cellular processes.

CO4: Acquire in-depth knowledge of cytoplasmic organization, chemical composition, and biological properties, understanding its significance in cellular dynamics.

CO5: Proficient in classifying and describing the structure and functions of major cell organelles, such as the endoplasmic reticulum, Golgi complex, lysosomes, ribosomes, mitochondria, and chloroplast.

CO6: Gain comprehensive insight into the nucleus, covering its characteristics, ultrastructure, and functions. Additionally, they will understand the cell cycle, cell division processes (mitosis and meiosis), and the significance of cell division.

CO7: Apply cytological techniques, specifically centrifugation and density gradient centrifugation, for the separation and analysis of cell organelles, demonstrating practical skills in laboratory settings.

Course Articulation Matrix of USZL112: FUNDAMENTALS OF CELL BIOLOGY

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	3	2	2	1	1	3
CO2	3	3	1	3	2	2	1	1	2
CO3	3	3	1	3	2	2	1	1	3
CO4	3	2	1	3	2	2	2	1	1
CO5	3	3	1	3	2	2	1	1	2
CO6	3	3	1	3	2	2	1	1	3
CO7	3	3	1	3	2	2	1	1	3

PO1: Disciplinary Knowledge

All course outcomes contribute significantly to the development of disciplinary knowledge in cell biology. Each CO focuses on a specific aspect of cell biology, such as historical understanding, comparative analysis, mastery of concepts, and application of knowledge.

PO2: Critical Thinking and Problem Solving

Each CO requires critical thinking and problem-solving skills. Students need to critically analyze historical perspectives, compare cell structures, understand complex concepts, and apply knowledge to solve problems related to cell biology.

PO3: Social Competence

The primary focus of the course is on biological and cellular aspects rather than on social competence. The course aims to provide a deep understanding of cell biology rather than emphasizing social aspects.

PO4: Research-related skills and Scientific temper

Each CO involves research-related skills, from understanding historical contexts to comparative analysis and application of cell cycle knowledge. The course promotes a scientific temper by requiring students to approach cell biology topics with systematic and evidence-based methods.

PO5: Trans-disciplinary knowledge

While the primary focus is on cell biology, the comparative analysis of cell structures (CO2) could involve knowledge from other disciplines, making it moderately related to trans-disciplinary knowledge.

PO6: Personal and professional competence

Understanding historical context (CO1) and applying knowledge (CO7) indirectly contribute to personal and professional competence. Students develop competence in understanding and applying cell biology concepts.

PO7: Effective Citizenship and Ethics

The course outcomes are primarily focused on cellular biology, and the direct link to effective citizenship and ethics is limited. The emphasis is on scientific understanding rather than societal implications.

PO8: Environment and Sustainability

Similar to effective citizenship and ethics, the course outcomes are not directly related to environmental and sustainability aspects. The primary focus is on cellular and biological processes rather than environmental considerations.

PO9: Self-directed and Life-long learning

All course outcomes contribute to the development of skills necessary for self-directed and life-long learning in the field of cell biology. The diverse topics covered in the course encourage students to continue learning beyond the classroom setting.

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester - I)

Course Code: USZL113

Course: III

Title of Course: ZOOLOGY PRACTICAL-I
(Practicals Corresponding to USZL111, USZL112)

Credit: 2

No. of Practical: Any 10

Learning Objectives:-

- Master fundamental principles of animal classification.
- Gain in-depth knowledge of specific invertebrate groups and their ecological roles.
- Develop practical skills in culturing and managing invertebrates.
- Enhance anatomical knowledge through practical dissection and observation.
- Master basic microscopy techniques and observe microscopic organisms.
- Understand the ultrastructure of key cell organelles and their functions.
- Integrate theoretical knowledge with real-world experience.

Learning Outcomes:-

Student will be able to-

- CO1: Demonstrate proficiency in taxonomic classification up to the class level for diverse phyla, including Protozoa, Porifera, Platyhelminthes, Aschelminthes, and Annelida.
- CO2: Cultivate and observe animals (Acanthamoeba, Hydra, Paramecium) to understand their life cycles and behaviours.
- CO3: Prepare a vermiculture laboratory unit through activity-based learning and comprehend the role of vermiculture in nutrient cycling.
- CO4: Develop anatomical proficiency through the dissection of earthworms, gaining insights into their digestive and nervous systems.
- CO5: Develop the ability to create accurate scientific drawings of locally available invertebrate specimens from different phyla.
- CO6: Understand and apply microscopy techniques, including the Standard Operating Procedure (SOP) for simple and compound microscopes.
- CO7: Conduct an ultrastructure study of cellular components (mitochondria, nucleus, endoplasmic reticulum, Golgi complex) and present findings using pictures, models, or charts.

Course Articulation Matrix of USZL113: ZOOLOGY PRACTICAL - I

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	1	3	1	2	1	1	3
CO2	2	3	1	3	1	3	1	2	3
CO3	3	3	1	3	1	3	1	2	3
CO4	1	2	1	2	1	3	1	1	2
CO5	3	3	1	3	1	3	1	2	3
CO6	3	3	1	3	1	3	1	1	3
CO7	3	3	1	3	1	2	1	1	3

PO1: Disciplinary Knowledge

All course outcomes directly contribute to the development of disciplinary knowledge in the field of biological sciences. Each CO focuses on a specific aspect of biology, from taxonomic classification to practical application of techniques, microscopy expertise, and ultrastructure analysis.

PO2: Critical Thinking and Problem Solving

Each CO requires critical thinking skills. Whether it's taxonomic classification, practical application of techniques, or analysis of cellular structures, students are consistently engaged in critical thinking and problem-solving exercises.

PO3: Social Competence

The course primarily focuses on technical and scientific aspects of biology, and the direct link to social competence is limited. The emphasis is on acquiring practical skills and knowledge in the biological sciences.

PO4: Research-related skills and Scientific temper

All COs involve research-related skills, ranging from taxonomic work to practical applications and microscopy. The course promotes a scientific temper by instilling a systematic and evidence-based approach to biological studies.

PO5: Trans-disciplinary knowledge

The course is more specialized in biological sciences, and the trans-disciplinary link is limited. While there may be some overlap, the primary focus is on the core principles and practices within the discipline.

PO6: Personal and professional competence

Each CO contributes to personal and professional competence. From mastering laboratory techniques to developing microscopy expertise and practical application skills, students gain competencies relevant to a professional setting.

PO7: Effective Citizenship and Ethics

The course is primarily centered around biological and laboratory skills, and the direct link to effective citizenship and ethics is limited. The emphasis is on technical proficiency and knowledge acquisition.

PO8: Environment and Sustainability

While not all COs directly address environmental and sustainability aspects, some, like practical application of techniques and microscopy expertise, may have implications for sustainability. The link is moderate and depends on specific applications.

PO9: Self-directed and Life-long learning

Each CO promotes self-directed and life-long learning. The nature of the biological sciences, with its rapidly evolving knowledge base, requires students to develop the skills necessary for continuous learning beyond the classroom setting.

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GRADUATE DEPARTMENT OF ZOOLOGY

SYLLABUS

FIRST YEAR B. Sc. Zoology
ACADEMIC YEAR 2022-2023
SEMESTER-II

**Anekant Education Society's
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OF ARTS, SCIENCE & COMMERCE, BARAMATI.
AUTONOMOUS**

**Scheme of Course Structure (CBCS) Faculty of Science
Department of Zoology**

SEMESTER-II

Class: F.Y.B.Sc.

Pattern: 40 (IA) + 60 (EA)

Semester	Course Code	Title of Course	No. of Credits
Semester II	USZL121	Animal Systematics and Diversity - II	2
	USZL122	Genetics	2
	USZL123	Zoology Practical-II	2

I A* - Internal Assessment

**E A* - External
Assessment**

तुळजाराम चतुर्चंद महाविद्यालय, बारामती

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester – II)

Course Code: USZL121

Course: I

Title of Course: Animal Systematics and Diversity – II

Credit: 2

No. of Lectures: 30

Learning Objectives:-

- Differentiate the key characteristics and classify Hemichordata, Urochordata, and Cephalochordata up to the order level.
- Compare and contrast the general characters of Cyclostomata, Pisces (Chondrichthyes and Osteichthyes), and Amphibia up to the order level, providing one example from each group.
- Analyze the affinities (relationships) of Hemichordata to other animal groups.
- Explain the phenomenon of retrogressive metamorphosis in Urochordata and its significance.
- Describe the migratory patterns of Pisces, highlighting the factors influencing their movement.
- Discuss Neoteny in Amphibia, its evolutionary implications, and its role in the development of specific characteristics.
- Identify and explain the external features and sexual dimorphism of a frog.

Learning Outcomes:-

After completion of this course students will be able to-

CO1: explain how the presence or absence of pharyngeal slits, notochord, and dorsal nerve cord differentiates Hemichordata, Urochordata, and Cephalochordata.

CO2: compare the adaptations for filter feeding in a Cephalochordate (Branchiostoma) and a Urochordate (Ascidia), highlighting the similarities and differences in their feeding mechanisms.

CO3: analyze the potential evolutionary relationships of Hemichordata to other invertebrate groups, considering shared characteristics and fossil evidence.

CO4: discuss the potential advantages and disadvantages of retrogressive metamorphosis in Urochordata, including its impact on reproduction and survival.

CO5: identify the major migratory routes of a specific fish species (e.g., salmon), explaining the environmental factors influencing their movement patterns.

CO6: evaluate the role of Neoteny in the evolution of specific amphibian features like paedomorphism and limb reduction, considering its ecological and developmental implications.

CO7: distinguish between the mating calls of male and female frogs within a specific species, explaining how these calls function in reproductive behaviour.

Course Articulation Matrix of USZL: 121: Animal Diversity – II

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	1	2	1	2	2
CO2	3	3	2	3	2	2	2	2	3
CO3	3	3	2	3	2	2	2	2	3
CO4	2	3	2	3	1	2	1	2	2
CO5	1	3	2	2	3	2	2	3	2
CO6	2	3	2	3	2	3	2	2	3
CO7	1	3	3	2	1	2	3	2	2

PO1 – Disciplinary Knowledge:

All COs are highly aligned with this PO as they involve detailed knowledge of specific phyla, evolutionary relationships, and ecological concepts.

PO2 - Critical Thinking and Problem Solving:

Most COs require critical thinking skills, especially in understanding evolutionary relationships (CO3) and discussing advantages and disadvantages (CO4).

PO3 - Social Competence:

CO1 and CO7 involve understanding social behaviors in specific species, aligning with social competence.

PO4 - Research-related skills and Scientific temper:

CO1, CO3, and CO5 involve analyzing and interpreting scientific information, aligning with research-related skills.

PO5 - Trans-disciplinary knowledge:

CO5 involves understanding migratory routes, which can be considered trans-disciplinary as it relates to ecology and environmental factors.

PO6 - Personal and professional competence:

CO6 involves evaluating the role of neoteny, linking personal and professional competence with understanding evolutionary processes.

PO7 - Effective Citizenship and Ethics:

While not explicitly stated, understanding the ecological impact of migration (CO5) and the consequences of metamorphosis (CO4) may touch on ethical considerations.

PO8 - Environment and Sustainability:

CO5 directly involves understanding environmental factors influencing migration patterns.

PO9 - Self-directed and Life-long learning:

Most COs involves continuous learning, especially as the fields of biology and ecology are dynamic.

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester – II)

Course Code: USZL122

Course: II

Title of Course: GENETICS

Credit: 2

No. of Lectures: 30

Learning Objectives:-

- Explain the fundamental principles of genetics, including basic concepts, Mendelian inheritance, and testing for heredity.
- Analyze the significance of multiple alleles and polygenic inheritance, with a focus on ABO & Rh blood groups and their medico-legal implications.
- Differentiate between co-dominance and incomplete dominance, and apply these concepts to analyze gene interaction scenarios involving complementary, supplementary, and inhibitory factors.
- Describe the structure and function of chromosomes, including their classification based on centromere position and types (autosomes, sex chromosomes), and highlight special types like polytene and lampbrush chromosomes.
- Explain the different mechanisms of sex determination (XX-XY, ZZ-ZW, XX-XO, Haploid-Diploid) and discuss phenomena like parthenogenesis, gynandromorphism, and environmental sex determination.
- Identify *Drosophila* as a model organism in genetic studies, analyze its morphology, sexual dimorphism, and life cycle, and explore various eye, wing, and body color mutants.
- Interpret human karyotypes, identify common syndromes like Down's, Klinefelter's, and Turner's, and understand the concept of inborn errors of metabolism as exemplified by albinism and phenylketonuria. Additionally, emphasize the importance of genetic counselling in human health.

Learning Outcomes:-

After completion of this course, students will be able to-

- CO1: Improved understanding of genetic diseases: By identifying the genes and mechanisms behind various diseases, researchers can develop better diagnostic tools, treatments, and preventative measures.
- CO2: Enhanced personalized medicine: Analyzing an individual's genetic makeup can lead to personalized treatment plans based on their unique response to medications and therapies.
- CO3: Advancements in gene editing technologies: CRISPR and other gene editing tools offer the potential to correct genetic mutations and treat diseases at their root cause.
- CO4: More informed reproductive choices: Genetic counseling can help couples understand their risk of passing on genetic conditions to their children, enabling them to make informed decisions about family planning.
- CO5: Increased agricultural productivity: Understanding the genetic basis of crop traits can lead to the development of more resilient and productive crops, contributing to global food security.
- CO6: Deeper understanding of human evolution and diversity: Studying the genetic variations within and between populations can shed light on human evolution, migration patterns, and the origins of complex traits.
- CO7: Improved forensic science: DNA analysis plays a crucial role in criminal investigations, helping to identify suspects, solve cold cases, and exonerate the wrongfully accused.

Course Articulation Matrix of USZL: 122: Genetics

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	1	2	2	1	2
CO2	3	3	2	3	1	3	2	1	2
CO3	3	3	1	3	1	2	1	1	3
CO4	1	2	3	3	1	2	3	1	2
CO5	1	2	1	2	3	2	1	3	2
CO6	1	2	2	2	3	2	2	2	2
CO7	3	2	1	2	1	2	3	1	2

PO1: Disciplinary Knowledge:

Each CO involves gaining in-depth understanding of genetic concepts, diseases, and technologies.

PO2: Critical Thinking and Problem Solving:

Analyzing complex genetic data, formulating hypotheses, and evaluating potential solutions for genetic diseases require critical thinking skills. CO4 necessitates critical analysis of genetic risks and making informed decisions based on evidence. CO6 involves drawing conclusions from genetic variations and understanding their implications for human evolution.

PO3: Social Competence:

CO4 emphasizes effective communication with individuals and families regarding genetic risks and options. CO5 involves collaboration with farmers and agricultural researchers to develop improved crops. CO7 requires clear and concise communication of DNA evidence in forensic investigations.

PO4: Research-related skills and Scientific temper -

All COs involve research activities like data analysis, hypothesis testing, and interpretation of results. All COs requires a scientific approach to genetic studies, emphasizing objectivity and evidence-based conclusions.

PO5: Trans-disciplinary knowledge:

CO3 involves understanding connections between gene editing technologies and other fields like medicine and ethics. CO5 necessitates integrating genetic knowledge with agricultural science for crop improvement. CO6 bridges the gap between genetics and anthropology, contributing to a broader understanding of human diversity.

PO6: Personal and professional competence:

Each CO requires self-directed learning, critical thinking, and problem-solving skills to successfully complete tasks and projects. PO6 emphasizes teamwork and collaboration, which are relevant to COs involving interaction with various stakeholders.

PO7: Effective Citizenship and Ethics:

CO4 necessitates ethical considerations in genetic counselling and respecting individual choices. CO6 involves understanding the ethical implications of genetic research and its impact on society. CO7 requires upholding ethical standards in forensic investigations and ensuring fair outcomes.

PO8: Environment and Sustainability:

CO5 focuses on developing sustainable agricultural practices through genetic engineering, contributing to environmental protection and food security.

PO9: Self-directed and Life-long learning:

Each CO requires continuous learning and adaptation to keep pace with advancements in genetics and related fields. PO9 emphasizes the importance of lifelong learning for professional success and personal growth in the field of genetics.

SYLLABUS (CBCS) FOR F.Y.B.Sc. ZOOLOGY (w. e. f. June, 2022)

Class: F.Y.B.Sc. (Semester - II)

Course Code: USZL123

Course: III

Credit: 2

Title of Course: ZOOLOGY PRACTICAL-II

No. of Practicals: Any 10

Learning Objectives:-

- Classify and explain the taxonomic position of five animal groups: Hemichordata (Balanoglossus), Urochordata (Hardmania), Cephalochordata (Amphioxus), Cartilaginous fish (Scoliodon), and Bony fish (Sea horse).
- Analyze and understand the structure and function of fish scales and chromatophores.
- Perform a morphometric study of a freshwater fish, including measuring body length, standard length, weight, and analyzing the length-weight relationship.
- Dissect and identify the morphological and anatomical features of a preserved frog specimen, focusing on external characters, sexual dimorphism, the digestive system, and the brain.
- Collect, photograph, and identify five different animals based on their morphological characteristics, linking them to previous practical exercises.
- Research and present profiles of two influential geneticists, highlighting their contributions to the field.
- Analyze human blood groups (ABO and Rh-factor) and solve problems related to monohybrid, dihybrid crosses, and ABO blood groups.

Learning Outcomes:-

Student will be able to-

- CO1: Classify animal groups based on morphological characteristics and link them to their evolutionary relationships. (Hemichordata, Urochordata, Cephalochordata, Cartilaginous fish, Bony fish)
- CO2: Analyze the structure and function of fish scales and chromatophores, relating them to adaptation and survival.
- CO3: Conduct a morphometric analysis of a freshwater fish, interpreting the data and calculating the length-weight relationship for health assessment.
- CO4: Dissect a preserved frog specimen, identifying and explaining the functions of key anatomical features, including sexual dimorphism.
- CO5: Collect and identify five different animals in your local environment based on their morphological characteristics, linking them to previous taxonomic exercises.
- CO6: Present a profile of a prominent geneticist, highlighting their contributions to the field and their impact on our understanding of heredity.
- CO7: Solve genetic problems involving monohybrid and dihybrid crosses, applying the principles of dominant and recessive alleles to predict blood group inheritance in humans (ABO and Rh-factor).

Course Articulation Matrix of USZL: 123: Zoology Practical-II

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	2	3	2	3	2	2	3
CO2	3	3	2	3	2	3	2	2	3
CO3	3	3	2	3	2	3	2	2	3
CO4	3	3	2	3	2	3	2	2	3
CO5	3	3	2	3	2	3	2	2	3
CO6	3	3	3	3	3	3	3	3	3
CO7	3	3	2	3	2	3	2	2	3

PO1: Disciplinary Knowledge:

CO1, CO2, CO3, CO4 are directly assess knowledge of anatomy, morphology, evolution, and adaptation in the animal kingdom. They require students to understand key concepts and theories within the field of zoology. CO5 and CO6 involve applying taxonomic knowledge to real-world scenarios, identifying animals in their environment, and understanding the contributions of prominent geneticists.

PO2: Critical Thinking and Problem Solving:

CO3: Analyzing morphometric data and calculating the length-weight relationship requires critical thinking skills to interpret data and draw conclusions about fish health.

CO7: Solving genetic problems involving crosses necessitates critical thinking about allele inheritance patterns and predicting outcomes.

PO3: Social Competence:

CO5: Identifying and presenting animals in a local environment can involve communication and collaboration with others, fostering social competence. CO6: Presenting a profile on a geneticist can involve research, communication, and presentation skills, contributing to social competence development.

PO4: Research-related skills and Scientific temper:

CO3: Conducting a morphometric analysis involves research skills like data collection, analysis, and interpretation, promoting scientific inquiry. CO4, CO5: Dissecting a frog and identifying animals requires meticulous observation, data collection, and analysis, fostering scientific temper.

PO5: Trans-disciplinary knowledge:

CO6, CO7: Linking genetics to human blood group inheritance demonstrates the application of genetic principles to understand human health, showcasing trans-disciplinary knowledge.

PO6: Personal and professional competence:

CO2, CO3, CO4: Dissection, morphometric analysis, and interpreting data require attention to detail precision, and time management, building personal competence. CO6, CO7: Research, presentation, and problem-solving activities enhance critical thinking and communication skills, contributing to professional competence.

PO7: Effective Citizenship and Ethics:

CO5, CO6: Identifying animals and appreciating their diversity in the local environment can foster environmental awareness and responsible citizenship. CO7: Understanding genetic principles and their implications for human health can promote ethical considerations in research and healthcare.

PO8: Environment and Sustainability:

CO5: Identifying animals in your local environment can contribute to understanding their ecological roles and importance in maintaining biodiversity.

PO9: Self-directed and Life-long learning:

All COs require independent learning, research, and analysis, promoting self-directed learning. CO6: Learning about a prominent geneticist can inspire an interest in lifelong learning and scientific exploration.

Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE

OF ARTS, SCIENCE & COMMERCE, BARAMATI.
(AUTONOMOUS INSTITUTE)



SYLLABUS
SECOND YEAR B.Sc. ZOOLOGY
ACADEMIC YEAR 2023-2024

तुळजाराम चतुरचंद महाविद्यालय, बारामती

SEMESTER - III

Anekant Education Society's
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COMMERCE, BARAMATI.
AUTONOMOUS**

Scheme of Course Structure (CBCS)

Faculty of Science

Department of Zoology

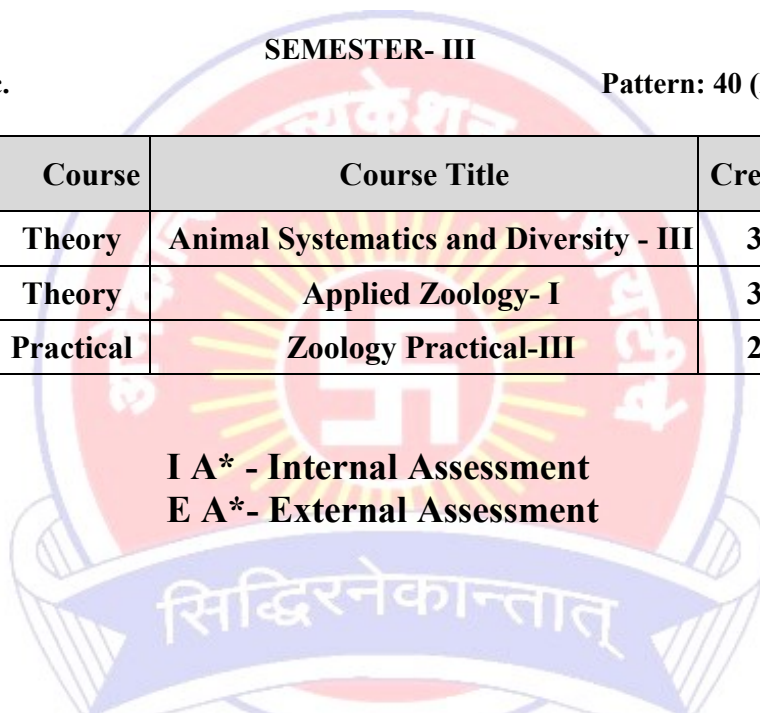
SEMESTER- III

Class: S.Y.B.Sc.

Pattern: 40 (IA) + 60 (EA)

Sr. No.	Code	Course	Course Title	Credit	Exam	Marks
1	USZL 231	Theory	Animal Systematics and Diversity - III	3	I / E	40 + 60
2	USZL 232	Theory	Applied Zoology- I	3	I / E	40 + 60
3	USZL 233	Practical	Zoology Practical-III	2	I / E	40 + 60

**I A* - Internal Assessment
E A*- External Assessment**



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SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology

Class: S.Y. B.Sc.

Course Name: Animal Systematics and Diversity-III

Number of Credits: 03

Program Code: USZL

Semester: III

Course Code: USZL 231

Number of Lectures: 48

Course Objectives:-

- Distinguish between different classes with highlighting distinct characteristics.
- Assessment of special biological processes in organisms.
- Examination of cockroach anatomy and physiology.
- Assess the ecological roles and economic importance of the studied invertebrates.
- Acquire taxonomic knowledge to identify and classify unknown invertebrates.
- Assess the evolutionary adaptations and biological strategies displayed by different invertebrate groups.
- Explore the behavioral patterns in organisms.

Course Outcomes:-

Student will be able to-

- CO 1: distinguish distinct characteristics of various invertebrate classes, facilitating precise classification and identification.
- CO 2: assess and analyze specific biological phenomena in invertebrates.
- CO 3: comprehensively examine the anatomy and functionality of cockroach systems.
- CO 4: critically evaluate the ecological roles and economic importance of studied invertebrates.
- CO 5: acquire taxonomic knowledge essential for identifying and classifying unknown invertebrates.
- CO 6: evaluate and interpret the evolutionary adaptations and biological strategies exhibited by diverse invertebrate groups.
- CO 7: explore and analyze behavioral patterns in various invertebrate species.

Course Articulation Matrix of USZL 231: Animal Systematics & Diversity-III
Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	3	3	1	1	1	1	1	1
CO2	3	2	3	1	1	1	1	1	1
CO3	2	2	3	3	1	1	1	1	1
CO4	2	2	2	3	2	1	1	1	1
CO5	2	3	1	2	2	1	1	1	1
CO6	1	1	1	1	2	1	1	1	1
CO7	1	1	1	2	3	1	2	2	3

PO1: Disciplinary Knowledge

All of the course outcomes (COs) are directly mapped to PO1 because it requires students to acquire and apply knowledge about invertebrate classification and identification.

PO2: Critical Thinking and Problem Solving

CO2 and 6 are directly mapped to PO2 because they require students to require not just knowledge but also analytical skills to assess phenomena, evaluate adaptations, and solve problems related to invertebrate biology.

PO3: Social Competence

CO3 and 4 are directly mapped to PO3 because they focus on the social and economic relevance of invertebrates, promoting social awareness.

PO4: Research-related skills and Scientific temper

CO2 and 5 are directly mapped to PO4 because they involve research elements like data analysis, interpretation, and critical thinking, essential for scientific investigations in the field.

PO5: Trans-disciplinary knowledge

CO1 directly mapped to PO5 because they require students to drawing connections with other disciplines like ecology, evolution, and genetics.

PO6: Personal and professional competence

COs are also directly mapped to PO6 because they contribute to personal and professional growth through skill development, knowledge building, and critical thinking.

PO7: Effective Citizenship and Ethics

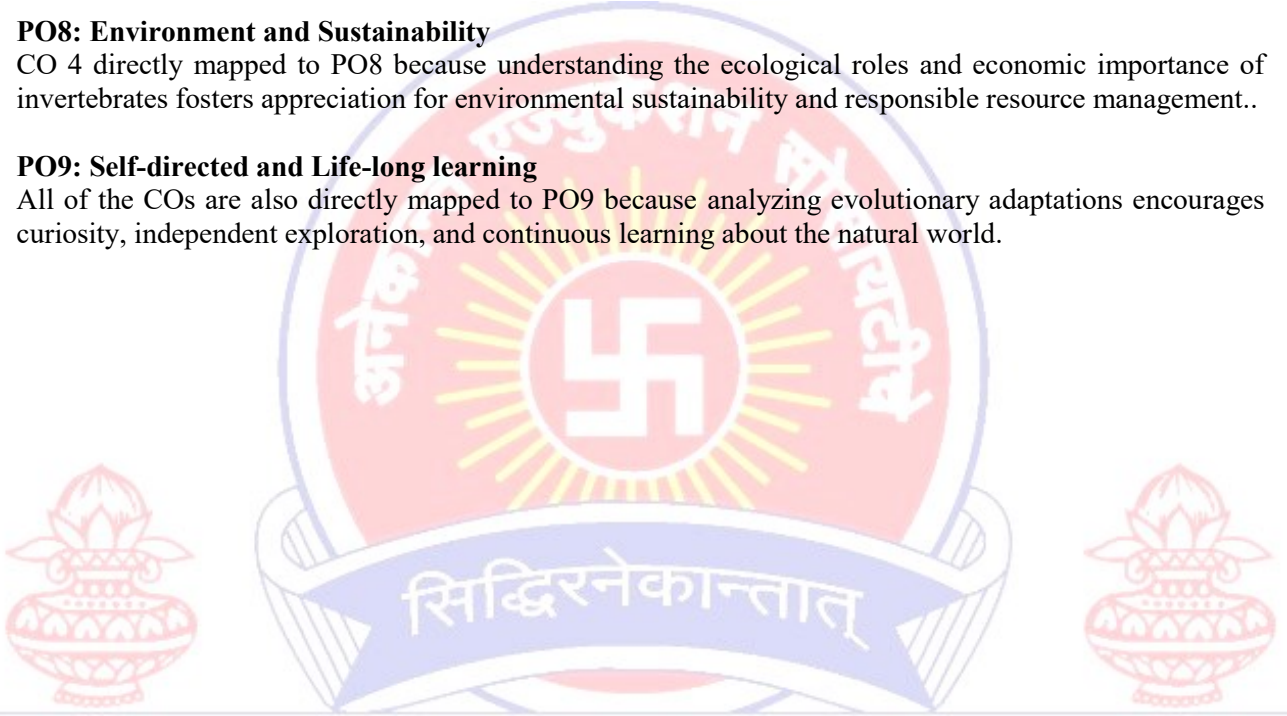
CO 7 is directly mapped to PO7 because studying animal behavior promotes ethical considerations towards living organisms and responsible interaction with the environment.

PO8: Environment and Sustainability

CO 4 directly mapped to PO8 because understanding the ecological roles and economic importance of invertebrates fosters appreciation for environmental sustainability and responsible resource management..

PO9: Self-directed and Life-long learning

All of the COs are also directly mapped to PO9 because analyzing evolutionary adaptations encourages curiosity, independent exploration, and continuous learning about the natural world.



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SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology

Class: S.Y. B.Sc.

Course Name: Applied Zoology-I

Number of Credits: 03

Program Code: USZL

Semester: III

Course Code: USZL 232

Number of Lectures: 48

Course Objectives:-

- Understand the fundamentals of fisheries and aquaculture.
- Gain comprehensive knowledge of freshwater pearl culture.
- Develop an understanding of Lamellidans spp. morphology, anatomy, and their role in pearl formation.
- Master the different implantation techniques in pearl culture.
- Gain knowledge of post-operative care and marketing in pearl culture.
- Develop an understanding of Integrated Pest Management in agriculture crops.
- Gain knowledge of dairy science

Course Outcomes:-

Student will be able to-

- CO1: demonstrate comprehensive knowledge of the foundational principles and practices in fisheries and aquaculture.
- CO2: attain mastery in freshwater pearl culture techniques.
- CO3: develop a comprehensive understanding of Lamellidans spp., exploring their morphology, anatomy, and their pivotal role in the formation of pearls.
- CO4: acquire proficiency in various implantation methods used in pearl culture.
- CO5: gain an understanding of post-operative care for molluscs post-implantation and knowledge of marketing strategies for cultured pearls.
- CO6: develop a comprehensive understanding of integrated pest management techniques.
- CO7: attain proficiency and comprehensive knowledge in dairy science.

Course Articulation Matrix of USZL 232: Applied Zoology-I Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	1	1	2	1	2	1
CO2	3	2	1	2	1	2	1	1	1
CO3	3	2	1	2	1	1	1	1	1
CO4	3	2	1	1	1	2	1	1	1
CO5	2	2	2	1	2	2	1	1	1
CO6	3	3	2	2	2	2	2	3	2
CO7	3	2	2	2	2	2	2	2	2

PO1: Disciplinary Knowledge

All of the COs are directly mapped to PO1 because they require students to have strong understanding of key concepts and practices in fisheries and aquaculture. For example, CO2 requires students to In-depth knowledge of pearl formation, implantation methods, and pearl care.

PO2: Critical Thinking and Problem Solving

All of the COs are directly mapped to PO2 because they require students to apply critical thinking and problem-solving skills to analyze fish populations, manage ponds, and select appropriate aquaculture techniques. For example, CO2 requires students to analyze post-operative issues, implements corrective measures, and evaluates pearl quality for marketing.

PO3: Social Competence

All of the COs are directly mapped to PO3 because they require students to interact with others in a professional and effective manner. For example, CO6 requires students to develop skills to educate others about IPM methods and promote their adoption in communities.

PO4: Research-related skills and Scientific temper

All of the COs are directly mapped to PO4 because they require students to apply the principles of scientific research to their work. For example, CO3 encourage students to observe, collect the data and potential for further research in pearl culture.

PO5: Trans-disciplinary knowledge

All of the COs are directly mapped to PO5 because they require students to apply knowledge from different disciplines to solve problems in the field of applied zoology. For example, CO4 requires students to integrate with ecology, environmental science, and agricultural economics for sustainable pest management.

PO6: Personal and professional competence

All of the COs are directly mapped to PO6 because they require students to demonstrate the personal and professional skills that are essential for success in the field of applied zoology. For example, CO7 requires students to develop skills in animal husbandry, recordkeeping, data analysis, and operating milk processing equipment.

PO7: Effective Citizenship and Ethics

All of the COs are directly mapped to PO7 because they require students to uphold the ethical standards in applied zoology. For example, CO6 requires students to promote responsible pesticide use, environmental protection, and sustainable agricultural practices.

PO8: Environment and Sustainability

All of the COs are directly mapped to PO8 because they require students to be aware of the environmental and sustainability implications of their work. For example, CO6 requires students to focus on minimizing environmental impact of pest control and promoting sustainable agriculture.

PO9: Self-directed and Life-long learning

All of the COs are directly mapped to PO9 because they require students to develop the skills necessary for self-directed and lifelong learning. For example, CO3 provides foundation for further learning and exploration in Lamellidan biology and pearl formation.

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SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology

Class: S.Y. B.Sc.

Course Name: Zoology Practical - III

Number of Credits: 02

Program Code: USZL

Semester: III

Course Code: USZL 233

Number of Practicals: 10

Learning Objectives:-

- Develop the ability to classify organisms to their respective class based on specific characteristics.
- Gain in-depth knowledge of morphology, anatomy and physiology of cockroach through practical study and analysis.
- Acquire practical skills in temporary and permanent mountings of insects.
- Develop expertise in taxonomic identification, feeding habits, and economic importance of specific fish.
- Acquire knowledge of dairy science.
- Understand the nature of damage caused by specific insect pests
- Acquire knowledge of milk quality analysis.

Learning Outcomes:-

Student will be able to-

CO1: identify and classify organisms to their respective classes based on key morphological characteristics.

CO2: explain the anatomical structures and physiological processes of the cockroach.

CO3: skillfully master temporary and permanent mounting techniques for preparing insect specimens for preservation and identification.

CO4: accurately identify common fish species based on their taxonomic characteristics.

CO5: evaluate the nutritional value of dairy products and their role in human health and diet.

CO6: identify and characterize the types of damage caused by specific insect pests in agricultural crops and stored products.

CO7: interpret milk quality analysis results and their implications for milk processing, safety, and consumer health.

Course Articulation Matrix of USZL 233: Zoology Practical-III

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	1	1	2	1	1	2
CO2	3	2	1	2	1	2	1	1	2
CO3	2	2	1	1	1	3	1	1	1
CO4	3	2	2	2	2	2	2	3	2
CO5	3	2	2	2	2	2	2	2	2
CO6	2	2	2	2	2	2	2	3	2
CO7	3	2	2	2	2	3	2	2	2

PO1: Disciplinary Knowledge

All of the COs are directly mapped to PO1 because they require students to have strong understanding of key concepts and practices in taxonomy and applied zoology. For example, CO1 requires students to have an in-depth understanding of taxonomic principles and key morphological characteristics for classification.

PO2: Critical Thinking and Problem Solving

All of the COs are directly mapped to PO2 because they require students to apply critical thinking and

problem-solving skills. For example, CO3 requires students to select appropriate mounting method based on specimen size, fragility, and purpose of preservation.

PO3: Social Competence

All of the COs are directly mapped to PO3 because they require students to interact with others in a professional and effective manner. For example, CO4 requires students develop communication skills to educate others about fish species, their importance, and conservation efforts.

PO4: Research-related skills and Scientific temper

All of the COs are directly mapped to PO4 because they require students to apply the principles of scientific research to their work. For example, CO3 encourage students to observe, collect the data and critical thinking about pest populations and their impact on agriculture.

PO5: Trans-disciplinary knowledge

All of the COs are directly mapped to PO5 because they require students to apply knowledge from different disciplines to solve problems in the field of applied zoology. For example, CO4 requires students to integrate with food science, chemistry, and public health for understanding milk quality and its impact on human health.

PO6: Personal and professional competence

All of the COs are directly mapped to PO6 because they require students to demonstrate the personal and professional skills that are essential for success in the field of applied zoology. For example, CO6 requires students to develop skills in field observation, damage assessment, and communication for pest control implementation.

PO7: Effective Citizenship and Ethics

All of the COs are directly mapped to PO7 because they require students to uphold the ethical standards in zoology. For example, CO6 requires students to promote responsible pesticide use, environmental protection, and sustainable agricultural approaches.

PO8: Environment and Sustainability

All of the COs are directly mapped to PO8 because they require students to be aware of the environmental and sustainability implications of their work. For example, CO6 requires students to focus on minimizing environmental impact of pesticides and promoting sustainable agriculture.

PO9: Self-directed and Life-long learning

All of the COs are directly mapped to PO9 because they require students to develop the skills necessary for self-directed and lifelong learning. For example, CO7 provides foundation for further exploration of pest identification, control methods, and sustainable agricultural practices.

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SYLLABUS

SECOND YEAR B.Sc. ZOOLOGY

ACADEMIC YEAR 2023-2024

SEMESTER - IV

तुळजाराम चतुरचंद महाविद्यालय, बारामती

Anekant Education Society's
**TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE &
COMMERCE, BARAMATI.
AUTONOMOUS**

Scheme of Course Structure (CBCS)

Faculty of Science

Department of Zoology

SEMESTER- III

Class: S.Y.B.Sc.

Pattern: 40 (IA) + 60 (EA)

Sr. No.	Code	Paper	Paper Title	Credit	Exam	Marks
1	USZL 231	Theory	Animal Systematics and Diversity – III	3	I / E	40 + 60
2	USZL 232	Theory	Applied Zoology- I	3	I / E	40 + 60
3	USZL 233	Practical	Zoology Practical-III	2	I / E	40 + 60

SEMESTER- IV

Sr. No.	Code	Paper	Paper Title	Credit	Exam	Marks
1	USZL 241	Theory	Animal Systematics and Diversity - IV	3	I / E	40 + 60
2	USZL 242	Theory	Applied Zoology- II	3	I / E	40 + 60
3	USZL 243	Practical	Zoology Practical-IV	2	I / E	40 + 60

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I A* - Internal Assessment
E A* - External Assessment

SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology
Class: S.Y. B.Sc.
Course Name: Animal Systematics and Diversity-IV
Number of Credits: 03

Program Code: USZL
Semester: IV
Course Code: USZL 241
Number of Lectures: 48

Learning Objectives:-

- Provide students with a comprehensive understanding of Reptilia, Aves, and Mammals classes, enabling them to differentiate between examples within each class and sub-class effectively.
- Explore reptile adaptations, including desert survival and venomous apparatus.
- Equipping students with knowledge for snake bite first aid and antivenin administration.
- Investigate bird migration, feather structure, beak and feet modifications, and the unique vocal organ.
- Gain insights into egg-laying mammals, aquatic mammals, and flying mammals,
- Explore the diversity of reproductive strategies and ecological niches within the Mammalia class.
- Enhancing knowledge of fish biology and anatomy, including external features, digestive, circulatory, respiratory, nervous, sensory, and reproductive systems.

Learning Outcomes:-

After completion of this course students will -

- CO1: confidently identify and distinguish examples within the Reptilia, Aves, and Mammals classes based on key morphological and ecological characteristics.
- CO2: explain the diverse adaptations of reptiles for desert survival, including thermoregulation, water conservation, and specialized feeding mechanisms.
- CO3: demonstrate proper snake bite first aid procedures and understand the principles of antivenin administration, recognizing the importance of responsible action in emergency situations.
- CO4: explain the structure and function of feathers, beaks, and feet modifications in birds, relating them to specific flight patterns, feeding strategies, and habitat preferences.
- CO5: identify and differentiate between egg-laying mammals, aquatic mammals, and flying mammals, highlighting their unique adaptations and ecological niches.
- CO6: accurately identify and describe the external features of various fish species, including their body shape, fins, scales, and sensory organs.
- CO7: explain the structure and function of the major internal systems in fish.

Course Articulation Matrix of USZL 241: Animal Systematics and Diversity-IV
Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	1	1	1	2	1	1	2
CO2	3	2	1	2	2	2	2	3	2
CO3	2	2	2	1	1	2	3	1	1
CO4	3	2	1	2	2	2	1	2	2
CO5	3	2	1	2	2	2	2	3	2
CO6	3	2	1	2	2	2	1	3	2
CO7	3	2	1	2	2	2	1	3	2

PO1: Disciplinary Knowledge

All of the COs are directly mapped to PO1 because they require students to have strong understanding of key concepts and practices in taxonomy and zoology. For example, CO1 requires students to have an in-depth understanding of taxonomic principles and key morphological characteristics for classification.

PO2: Critical Thinking and Problem Solving

All of the COs are directly mapped to PO2 because they require students to apply critical thinking and problem-solving skills. For example, CO3 requires students to analyze bite symptoms to assess severity and makes informed decisions on first aid actions and antivenin administration.

PO3: Social Competence

All of the COs are directly mapped to PO3 because they require students to interact with others in a professional and effective manner. For example, CO3 requires students develop communication skills to educate others about snake bite prevention, first aid, and responsible behavior in snake-inhabited areas.

PO4: Research-related skills and Scientific temper

All of the COs are directly mapped to PO4 because they require students to apply the principles of scientific research to their work. For example, CO4 encourage students to observe, collect the data and critical thinking about bird morphology and its connection to ecological roles.

PO5: Trans-disciplinary knowledge

All of the COs are directly mapped to PO5 because they require students to apply knowledge from different disciplines to solve problems in the field of zoology. For example, CO4 requires students to integrate with ecology, evolution, and biomechanics for understanding bird adaptations.

PO6: Personal and professional competence

All of the COs are directly mapped to PO6 because they require students to demonstrate the personal and professional skills that are essential for success in the field of zoology. For example, CO6 requires students to develop skills in field observation and data collection.

PO7: Effective Citizenship and Ethics

All of the COs are directly mapped to PO7 because they require students to uphold the ethical standards in zoology. For example, CO6 requires students to promote responsible fishing practices and awareness of the importance of fish biodiversity in aquatic ecosystems.

PO8: Environment and Sustainability

All of the COs are directly mapped to PO8 because they require students to be aware of the environmental and sustainability implications of their work. For example, CO7 requires students to focus on minimizing impact of environmental changes and pollutants on fish physiology and the importance of protecting aquatic ecosystems.

PO9: Self-directed and Life-long learning

All of the COs are directly mapped to PO9 because they require students to develop the skills necessary for self-directed and lifelong learning. For example, CO7 provides foundation for further exploration of mammalian diversity, evolution, and conservation research.

SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology
Class: S.Y. B.Sc.
Course Name: Applied Zoology-II
Number of Credits: 03

Program Code: USZL
Semester: IV
Course Code: USZL 242
Number of Lectures: 48

Learning Objectives:-

- To disseminate information on economic aspects of zoology like apiculture, sericulture.
- To encourage young learners for self-employment.
- To comprehend the functioning of apiculture sericulture industry and its scope in India.
- To study the honey bee species and bee products
- To study the varieties of silk-worms and host plants.
- To critically study the life history and rearing of *Bombyx mori*.
- To study the post harvesting processes in sericulture

Learning Outcomes:-

Students will be able to-

- CO1: acquire sound knowledge on different components of sericulture & bee keeping industry
CO2: identify different honey bee & silkworm species.
CO3: explain the tools & techniques used in apiculture & sericulture.
CO4: illustrate the diseases of honey bee & silkworm.
CO5: understand the economic importance of apiculture & sericulture.
CO6: get acquainted about communication system among the casts in the colony.
CO7: understand the post harvesting processes in sericulture.

Course Articulation Matrix of USZL 242: Applied Zoology –II

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	2	2	1	2	1	2	2
CO2	3	2	1	1	1	2	1	2	2
CO3	3	2	2	2	1	2	3	2	1
CO4	3	2	1	2	1	2	2	2	2
CO5	3	2	2	1	2	3	2	1	2
CO6	3	2	1	2	1	1	1	1	2
CO7	3	2	1	2	1	2	1	2	2

PO1: Disciplinary Knowledge

All of the COs are directly mapped to PO1 because they require students to have strong understanding of key concepts and practices in applied zoology. For example, CO1 requires students to have an in-depth understanding of various aspects like mulberry cultivation, silkworm rearing, honeybee management, honey production, processing, and marketing.

PO2: Critical Thinking and Problem Solving

All of the COs are directly mapped to PO2 because they require students to apply critical thinking and problem-solving skills. For example, CO4 requires students to analyze disease symptoms and environmental factors to identify potential causes and implement appropriate control measures.

PO3: Social Competence

All of the COs are directly mapped to PO3 because they require students to interact with others in a professional and effective manner. For example, CO5 requires students develop communication skills to educate others about the economic significance of these industries and their contribution to rural

livelihoods.

PO4: Research-related skills and Scientific temper

All of the COs are directly mapped to PO4 because they require students to apply the principles of scientific research to their work. For example, CO4 encourage students to observe, collect the data and analysis of disease outbreaks for informing prevention and control strategies.

PO5: Trans-disciplinary knowledge

All of the COs are directly mapped to PO5 because they require students to apply knowledge from different disciplines to solve problems in the field of zoology. For example, CO4 requires students to integrate with veterinary science and microbiology for understanding disease mechanisms and control methods.

PO6: Personal and professional competence

All of the COs are directly mapped to PO6 because they require students to demonstrate the personal and professional skills that are essential for success in the field of zoology. For example, CO6 provides essential knowledge for making informed decisions about starting or managing beekeeping and sericulture businesses.

PO7: Effective Citizenship and Ethics

All of the COs are directly mapped to PO7 because they require students to uphold the ethical standards in zoology. For example, CO6 requires students to promote fair trade practices, ethical treatment of workers and animals, and sustainable resource utilization within the industry.

PO8: Environment and Sustainability

All of the COs are directly mapped to PO8 because they require students to be aware of the environmental and sustainability implications of their work. For example, CO4 requires students to focus on assessing environmental factors influencing disease outbreaks and the importance of sustainable practices for maintaining healthy bee populations and silkworm production.

PO9: Self-directed and Life-long learning

All of the COs are directly mapped to PO9 because they require students to develop the skills necessary for self-directed and lifelong learning. For example, CO7 provides foundation for further exploration of disease research, prevention strategies, and sustainable beekeeping and sericulture practices.



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SYLLABUS (CBCS) FOR S. Y. B. Sc. ZOOLOGY (w. e. f. June, 2023)

Name of the Program: B.Sc. Zoology
Class: S.Y. B.Sc.
Course Name: Zoology Practical - IV
Number of Credits: 02

Program Code: USZL
Semester: IV
Course Code: USZL 243
Number of Practicals: 10

Learning Objectives:-

- To understand and classify various animals, including reptiles and birds into their respective taxonomic classes based on their characteristics and features.
- To examine analyze the adaptations in birds' beaks and feet.
- To provide insights into fish morphology and anatomy.
- To explore the life cycles and unique characteristics of important insects like the honey bee and silk moth.
- To gain practical knowledge of beekeeping
- To gain practical knowledge of sericulture.
- To conduct a hands-on project that investigates the economics of beekeeping and sericulture, and creates a short project report with visuals.

Learning Outcomes:-

Students will -

- CO1: develop a comprehensive understanding of the classification of animals, enabling them to identify and differentiate between different classes and species based on key features and characteristics.
- CO2: acquire knowledge of the adaptations in birds' beaks and feet and will be able to relate these adaptations to their feeding habits and habitats.
- CO3: gain practical skills in studying the external characters, digestive systems, and brains of fish, providing insights into the anatomical and physiological aspects of aquatic life.
- CO4: become familiar with the life cycles and anatomical structures of Honey bees and Bombyx mori, along with their importance in agriculture and ecology.
- CO5: develop a comprehensive understanding of bee biology, behavior, and their roles within the hive, facilitating effective hive management and sustainable practices.
- CO6: Gain a comprehensive understanding of the silk production process, including silk fiber extraction, spinning, weaving, and the various stages involved in silk fabric manufacturing.
- CO7: develop practical expertise in beekeeping and sericulture and also be able to analyze the economic aspects of these activities through their project report.

Course Articulation Matrix of USZL 243: Zoology Practical - IV

Weightage: 1: Partially related, 2: Moderately related, 3: Strongly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	1	2	2	1	2	1	2	2
CO2	3	2	1	2	2	2	1	2	2
CO3	3	2	1	2	2	2	1	3	2
CO4	3	2	1	2	2	2	2	3	2
CO5	3	2	2	2	1	3	2	1	2
CO6	3	2	1	2	2	2	2	3	2
CO7	3	2	2	1	2	3	2	1	2

PO1: Disciplinary Knowledge

All of the COs are directly mapped to PO1 because they require students to have strong understanding of key concepts and practices in zoology. For example, CO1 requires students of taxonomic systems, key morphological features, and ecological characteristics for classifying animals across various classes and species.

PO2: Critical Thinking and Problem Solving

All of the COs are directly mapped to PO2 because they require students to apply critical thinking and problem-solving skills. For example, CO3 requires students to analyze relationship between anatomical features and physiological functions in different fish species, explaining their adaptations to aquatic environments.

PO3: Social Competence

All of the COs are directly mapped to PO3 because they require students to interact with others in a professional and effective manner. For example, CO5 requires students develops communication skills to educate others about beekeeping practices and the importance of honeybee health.

PO4: Research-related skills and Scientific temper

All of the COs are directly mapped to PO4 because they require students to apply the principles of scientific research to their work. For example, CO5 encourage students to observe, collect the data and analysis of bee behavior and hive dynamics for research and improved management practices.

PO5: Trans-disciplinary knowledge

All of the COs are directly mapped to PO5 because they require students to apply knowledge from different disciplines to solve problems in the field of zoology. For example, CO6 requires students to integrate with with textile technology, engineering, and biomaterials science for developing new methods and materials in silk production.

PO6: Personal and professional competence

All of the COs are directly mapped to PO6 because they require students to demonstrate the personal and professional skills that are essential for success in the field of zoology. For example, CO7 provides essential knowledge for making informed decisions about starting or managing beekeeping and sericulture businesses.

PO7: Effective Citizenship and Ethics

All of the COs are directly mapped to PO7 because they require students to uphold the ethical standards in zoology. For example, CO7 requires students to promote fair trade practices, ethical treatment of workers and animals, and sustainable resource utilization within the industry.

PO8: Environment and Sustainability

All of the COs are directly mapped to PO8 because they require students to be aware of the environmental and sustainability implications of their work. For example, CO4 requires students to focus on understanding the environmental footprint of different silk production methods and the importance of sustainable practices for resource conservation.

PO9: Self-directed and Life-long learning

All of the COs are directly mapped to PO9 because they require students to develop the skills necessary for self-directed and lifelong learning. For example, CO7 provides foundation for further exploration of disease research, prevention strategies, and sustainable beekeeping and sericulture practices.