

ZOOLOGY

Course Outcome

Semester I

Major Course 1: Diversity of Non-Chordates

Course Outcomes:

- CO-1: Learn about the importance of systematics, taxonomy, and structural organization of non-chordates.
- CO-2: Understand & appreciate the diversity of non-chordates in various habitats.
- CO-3: Understand evolutionary history and relationships among non-chordates.
- CO-4: Critically analyze organization and complexity of non-chordates.
- CO-5: Recognize ecological roles of different phyla.
- CO-6: Enhance collaborative learning and communication skills through practicals and teamwork.

Minor Course / Multidisciplinary Course 1

Course Outcomes:

- CO-1: Learn importance of systematics, taxonomy, and structure of non-chordates.
- CO-2: Critically analyze complexity and features of non-chordates.
- CO-3: Recognize life functions and ecological roles across phyla.

Semester II

Major Course 2: Diversity of Chordates

Course Outcomes:

- CO-1: Understand different classes of chordates and their evolutionary relationships.
- CO-2: Study animal diversity and distinguishing features.
- CO-3: Appreciate functional similarities and differences in chordates.
- CO-4: Comprehend circulatory, nervous, and skeletal systems in chordates.
- CO-5: Understand habits and habitats of chordates across ecosystems.

Minor Course / Multidisciplinary Course 2

Course Outcomes:

- CO-1: Understand characteristics and classification of Hemichordata, Urochordata, and Cephalochordata.
- CO-2: Understand features of Agnatha, Pisces, Amphibia.
- CO-3: Learn features of Reptilia, Aves, Mammals, and adaptations like snake biting mechanism and bird flight.

Semester III

Major Courses:

1. MJC-3: Comparative Anatomy

- CO-1: Explain comparative anatomy of vertebrate systems.
- CO-2: Understand evolutionary organization of systems.
- CO-3: Learn skeletal components and modifications.
- CO-4: Analyze vertebrate respiratory and digestive systems.
- CO-5: Trace evolution of brain, sense organs, and excretory systems.
- CO-6: Evaluate developmental and functional systems in vertebrates.

2. MJC-4: Physiology

- CO-1: Know normal biological functions.
- CO-2: Correlate physiology with histology.
- CO-3: Solve physiological problems.
- CO-4: Understand homeostasis via system interactions.
- CO-5: Comprehend integrative physiology.

Minor / Multidisciplinary Course 3: Physiology

- Similar to MJC-4 outcomes but condensed for smaller credit load.

Semester IV

Major Courses:

1. MJC-5: Cell Biology

- CO-1: Understand cell biology principles.
- CO-2: Explain organelle structure and function.
- CO-3: Understand cell growth, division, and death.
- CO-4: Analyze cell signaling.
- CO-5: Comprehend disease mechanisms at the cellular level.
- CO-6: Learn advances in cell biology.

2. MJC-6: Endocrinology

- CO-1: Understand the endocrine system and hormones.
- CO-2: Appreciate homeostasis regulation by endocrine system.
- CO-3: Learn hormone action mechanisms.
- CO-4: Understand physiological process regulation by hormones.
- CO-5: Analyze endocrine disorders.

Semester V

Major Courses:

1. MJC-7: Ecology

- CO-1: Understand ecological components and limiting factors.
- CO-2: Learn population dynamics and growth models.
- CO-3: Understand community characteristics and succession.
- CO-4: Learn about ecosystems, food webs, and biogeochemical cycles.
- CO-5: Gain knowledge of biodiversity conservation.

2. **MJC-8: Biochemistry**
 - (Details partially available, likely cover metabolism, enzyme function, and biomolecules)
3. **MJC-9: Genetics**
 - (Likely includes gene structure, inheritance, molecular genetics, etc.)

Semester VI

Major Courses:

1. **MJC-10: Developmental Biology**
 - (Expected to cover embryology, gametogenesis, fertilization, organogenesis, etc.)
2. **MJC-11: Evolution**
 - (Likely includes evolutionary theory, speciation, adaptation, fossil record, etc.)
3. **MJC-12: Animal Behaviour**
 - (Likely covers ethology, behavior patterns, hormonal control, communication, etc.)

Semester VII

Major Courses:

1. **MJC-13: Molecular Biology**
2. **MJC-14: Research Methodology**
3. **MJC-15: Immunology and Microbiology**

(Detailed COs are partially available but expected to focus on molecular tools, immune response mechanisms, and research ethics)

Semester VIII

Major Courses:

1. **MJC-16: Instrumentation and Biostatistics**
2. **RP-1: Research Project / Dissertation**

(COs likely involve experimental design, scientific communication, instrumentation techniques, data analysis, and thesis writing)

Programme Outcomes (POs) for B.Sc. Zoology (4-Year Undergraduate Program)

Upon successful completion of the B.Sc. Zoology program, students will be able to:

PO1: Disciplinary Knowledge

Demonstrate a broad and fundamental understanding of the major concepts, principles, and theoretical frameworks in Zoology, including animal diversity (both non-chordates and chordates), comparative anatomy, physiology, genetics, evolution, cell biology, and ecology.

PO2: Practical and Analytical Skills

Develop strong laboratory skills and proficiency in biological techniques through hands-on experiments across physiology, microscopy, molecular biology, and ecological analysis. Analyze and interpret biological data using quantitative and qualitative approaches.

PO3: Scientific Communication and Collaboration

Effectively communicate biological concepts, experimental findings, and analytical insights in oral and written formats. Engage in collaborative work through group projects, discussions, and practical exercises, enhancing teamwork and interpersonal skills.

PO4: Evolutionary and Ecological Awareness

Understand and appreciate the evolutionary relationships among organisms, mechanisms of adaptation, and the interdependence of organisms and their environment. Recognize the importance of biodiversity, ecological balance, and conservation strategies.

PO5: Research Aptitude and Methodological Competence

Gain an introductory experience of scientific research, including designing and conducting investigations, using appropriate tools and methods, and adhering to ethical scientific practices. Develop competence in hypothesis testing, fieldwork, and documentation.

PO6: Problem Solving and Critical Thinking

Apply critical thinking to understand structure-function relationships in biological systems. Solve complex biological problems using integrative approaches that span molecular, cellular, organismal, and ecological levels.

PO7: Technological Literacy

Use modern biological tools, software, and instrumentation in areas like biochemistry, molecular biology, microscopy, and bioinformatics to enhance understanding of living systems.

PO8: Ethical and Social Responsibility

Recognize ethical issues in animal handling, biodiversity use, laboratory practices, and research. Show sensitivity toward animal welfare, environmental sustainability, and societal applications of biological knowledge.

PO9: Lifelong Learning and Career Preparedness

Be prepared for higher studies or careers in teaching, research, environmental consultancy, laboratory work, or public service. Cultivate a mindset for lifelong learning in rapidly advancing areas of zoological sciences.

Cross-Cutting Issues in the Zoology Curriculum

1. Professional Ethics

Relevance in Curriculum:

- Courses such as **Research Methodology (MJC-14)** and **Dissertation/Project Work (RP-1)** in Semester VII & VIII foster awareness about scientific integrity, plagiarism, proper citation, data authenticity, and responsible research practices.
- **Animal Behaviour (MJC-12)** and **Physiology (MJC-4)** include ethical aspects of animal experimentation and humane treatment of organisms.
- Emphasis on lab safety, biosafety, and ethical handling of biological materials throughout practicals.

Embedded Learning:

- Understanding ethical dilemmas in fieldwork and lab work.
- Promoting honesty, integrity, and respect in peer collaborations and data reporting.

2. Gender Sensitization

Relevance in Curriculum:

- **Developmental Biology (MJC-10)** and **Endocrinology (MJC-6)** cover human reproduction, hormonal regulation, and gender-related physiological aspects, fostering scientific and inclusive understanding of sex and gender.
- Opportunities to address **gender disparities in science** through discussions, seminars, and group projects.
- Equal participation and collaborative learning are promoted in practical and group-based coursework.

Embedded Learning:

- Encourages respect for all genders in academic and professional contexts.
- Sensitizes students to gender-based physiological and behavioral diversity in the animal kingdom and human society.

3. Human Values

Relevance in Curriculum:

- **Comparative Anatomy (MJC-3)** and **Evolution (MJC-11)** provide insight into the unity and diversity of life, promoting respect for all forms of life.
- Activities such as group discussions, field studies, and collaborative projects develop values like cooperation, empathy, accountability, and leadership.
- **Disaster Risk Management (AEC-3)** and **NSS/NGO/Social Service (AEC-4)** involve community service components that cultivate civic responsibility and compassion.

Embedded Learning:

- Cultivates ethical reasoning and humane perspectives through biological understanding.
- Reinforces responsibility toward peers, subjects of study (animals), and society.

4. Environmental Awareness and Sustainability

Relevance in Curriculum:

- **Ecology (MJC-7)** and **Environmental Science (AEC-2)** directly address environmental problems, ecosystem management, conservation biology, biodiversity loss, pollution, and climate change.
- **Animal Behaviour (MJC-12)** and **Zoological Fieldwork** link animal adaptation to environmental contexts.
- Practical sessions in **Ecology, Environmental Science, and Biostatistics** promote sustainable resource use and environmental monitoring.

Embedded Learning:

- Encourages critical thinking on sustainable practices, waste reduction, and biodiversity conservation.
- Develops environmental stewardship through field visits, biodiversity documentation, and conservation-focused projects.

5. Integration Across Curriculum

Issue	Integrated Through
Professional Ethics	Research, lab work, project writing, plagiarism policy, animal handling guidelines
Gender	Reproductive biology, endocrinology, inclusive language and examples, student interactions
Human Values	Collaborative learning, social outreach (AEC/NSS), comparative biology, ethics modules
Environment & Sustainability	Ecology, field studies, biodiversity projects, sustainable lab practices

Conclusion:

The Zoology curriculum not only imparts core disciplinary knowledge but also encourages holistic development through its integration of cross-cutting themes. This promotes the creation of responsible, ethical, and environmentally aware graduates who are sensitive to gender and social diversity.