

**Name of the Programme: M. Sc. Zoology**

**Course Code: ZOO-608**

**Title of the Course: Ornithology (Theory)**

**Number of Credits: 03**

**Effective from AY: 2023-24**

<b>Pre-requisites for the Course:</b>	Basic knowledge on birds and their identification at taxonomic level and the systematics Parallel enrollment for ZOO-610 Ornithology (Practicals)	
<b>Course Objectives:</b>	<ol style="list-style-type: none"><li>1. To develop major concepts in ornithology, including avian origin, evolution, systematics, distribution, flight adaptations, and physiology.</li><li>2. To review ecology of birds with respect to their feeding, breeding, roosting and migration.</li><li>3. To explain methodology in ornithology</li><li>4. To provide knowledge on advances in applied ornithology</li><li>5. To review the recent research work in the field of ornithology</li></ol>	
<b>Content:</b>	<b>Module 1</b> Avian origin, evolution, systematics, distribution, flight adaptations and physiology: Evolution- Diversification of modern birds – Adaptive radiation & speciation in birds. Flightless birds and adaptations Topography of bird, types of beaks, types of feet, types of feathers, types of pigments, visual functions of plumage, flight: forms, mechanisms & energetics Avian systematics - avian classification, diversity and distribution of birds of India. Endemism in Indian avifauna – Endemic Bird Areas of India. Flight Adaptations - morphological, anatomical and physiological. Physiology- vocal organ and vocalization, Neurophysiology of song control system, Analysis of bird song using Acoustic spectroscopy, colour physiology of iridescent and non- iridescent feathers and gloss production; Thermoregulatory mechanisms; avian eye and its adaptations Biology of moulting in birds (periodic and forced moulting).	15 hours
	<b>Module 2</b> Avian Ecology: Avian food and foraging - diversity of foods	15 hours

	<p>and foraging behaviors, feeding specialization and generalization, resource partitioning, colonial behaviour, cooperation, competition and conflicts.</p> <p>Breeding- nesting territories, communal nesting, bird songs, courtship, mating systems,</p> <p>types of nests, clutch size, parental care, nest parasitism.</p> <p>Migration - types of migration, flyways of migrations, physiological aspects of migration, orientation &amp; navigation in migratory birds, threats to migratory bird populations.</p> <p>Roosting behaviour</p> <p><b>Module 3</b></p> <p>Applied ornithology: Importance of bird population monitoring; census techniques - applications, assumptions &amp; limitations; methods: Line transects, point counts, fixed and variable width and call counts.</p> <p>Bird Banding- Principles of mist-netting; types of marking birds: rings/bands, flags, tags, dyes, and natural markers</p> <ul style="list-style-type: none"> <li>– Radio-tracking of birds &amp; satellite telemetry.</li> <li>- Conservation of threatened avifauna</li> <li>- Captive breeding &amp; ex-situ conservation of critically endangered birds</li> <li>- Birds as indicators of environmental health – Merits and limitations of birds as ecological indicators, Birds as model systems in applied genetic studies.</li> <li>-Birds as pests in agriculture, pisciculture, apiculture, sericulture, and free-ranging poultry farms</li> <li>– Role of birds in the dispersal of weeds, parasitic, and invasive plants</li> <li>– Birds as vectors of pathogens and parasites – Zoonoses.</li> <li>– Bird strike hazards to aircraft &amp; their management,</li> <li>- Birdwatching as an emerging eco-tourism venture</li> <li>- Biomimicry &amp; birds – Aerodynamic studies, bionic bird, bullet train inspired by Kingfisher.</li> <li>-Recent research in the field of ornithology.</li> </ul>	15 hours
<b>Pedagogy:</b>	<p>Use of conventional, online and ICT Methods.</p> <p>Field visit/project/self-study/Lecture/Tutorials/Assignments</p>	
<b>References/</b>	<p>1. S. Ali, The Book of Indian Birds. India, Bombay Natural History Society</p>	

<b>Readings:</b>	<p>and Oxford University Press, 2016.</p> <ol style="list-style-type: none"> <li>2. C. J. Bibby, N.D. Burgess, A. Hill, Bird Census Techniques. UK, Academic Press, 1992.</li> <li>3. M. S. Brainard, and A. J. Doupe,. Auditory feedback in learning and maintenance of vocal behavior. (1, 31-40) Nature Rev. Neurosci, 2000</li> <li>4. J. Faborg and S. B. Chaplin, Ornithology: an Ecological Approach. New Jersey, Prentice Hall Inc. 1988.</li> <li>5. F. B. Gill, Ornithology. (3rd ed.) New York, NY. W. H. Freeman and Company, 2007</li> <li>6. P. Goodfellow, Birds as Builders. New York, Arco Publishing Co., 1977</li> <li>7. J. Lovette and J. W. Fitzpatrick, Handbook of Bird biology (3rd Ed) Wiley publishers. 2016</li> <li>8. C Inskipp, R Grimmett and T Inskipp, Birds of the Indian Subcontinent, Princeton University Press2011.</li> <li>9. D.B. Meyer, The Avian Eye and its Adaptations. In: Crescitelli F. (eds) The Visual System in Vertebrates. Handbook of Sensory Physiology, (vol 7 / 5). Berlin, Heidelberg Springer,. 1977</li> <li>10. P. D. Sturkie, Sturkie's Avian Physiology. 5th Edition. San Diego, Academic Press, 1998.</li> </ol>
<b>Course Outcomes:</b>	<p>The learner will</p> <ol style="list-style-type: none"> <li>1. Identify the birds on the field and be familiar with the methods for bird studies.</li> <li>2. Analyze various aspects of avian biology such as evolution, taxonomy, anatomy, and physiology.</li> <li>3. Review ecology of birds with respect to their feeding, breeding, roosting and migration.</li> <li>4. Comment on applied ornithology</li> <li>5. Reflect on recent research in the field</li> </ol>