FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Honors/ Honors with research)*			**Semester - VIII**	Session: **2024-2025**
1	**Course Code**	**ZOSE- 10T**		
2	**Course Title**	**Behaviour and Chronobiology**		
3	**Course Type**	**Discipline Specific Elective**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Learn a wide range of theoretical knowledge about the animal behavior. ➢ Develop skills, to understand the responses of animal according to stimuli. ➢ Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. ➢ Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. ➢ Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Behaviour and the response invoking stimuli:** Animal behavior: Scope and importance of study. Ethology: history & branches. Ethogram: analysis of behavior. Causation of Behaviour: Proximate and ultimate causes of behavior. Stimulus: Definition, Types of stimuli invoking response: internal and external. Patterns of behaviour: Foraging behaviour, Aggressive behavior, Territorial behaviour. Allelomimetic behavior. Stereotyped Behaviors: Taxis and Reflexes: Taxis: Phototaxis, Geotaxis, Thermotaxis, Thigmotaxis, Galvanotaxis, Chemotaxis and Rheotaxis, Klinotaxis and Telotaxis. Reflexes: Definition, Kinds- Localized, Tonic & Phasic, Types of reflex action unconditioned reflexes and Conditioned reflexes	12
II	**Innate and Learning Behavior: Innate or Instinct Behaviour:** Fixed action Pattern: Definition and Characteristics: Constancy, Resistance to Phylogenetic Changes, Concept of Sign, Innate Releasing Mechanism (IRM) and Action Specific Energy (ASE). Bird migration, Navigation and Orientation. Learning Behavior: Classical conditioning (Pavlov Experiment), Types of Conditioning: Forward, Backward, Simultaneous and Temporal conditioning. Properties of Conditioning: Generalization, Discrimination, Extinction, Recovery from Extinction, Acquisition, Reinforce, Positive and Negative conditioning. Habituation. Instrumental learning / trial and error. Imprinting: types of imprinting: filial and sexual. Reasoning and Insight learning. Neural mechanism of learning.	11
III	**Social behavior and Evolutionary aspects of Behavior:** Social organization in honey bee & Primates. Elements of Socio-biology: Eusociality, Selfishness, cooperation, altruism, kinship, reciprocation and inclusive fitness. Communication: chemical, visual, light, tactile and audio. Evolutionary aspects of behavior: feeding strategies, Mimicry and Colouration, Evolution of reproductive behavior: Theory of Sexual Selection, secondary sex characteristics, Parental care in Fish and Amphibia.	11
IV	**Chronobiology:** Biological Rhythm: Types of biological rhythm: Ultradian, Circadian and Infradian. Characteristics of rhythm: mesor, amplitude, acrophase, period and phase. Patterns of biological rhythm: Exogenous and Endogenous rhythm; Entrained and Free run rhythm. Advantages of biological rhythms. Biological clock: components of clock, functions of biological clock. Applications of chronobiology.	11
Keywords	*Ethogram, Mimicry, Reflexes, biological rhythm, Parental care, Imprinting, Biological clock*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Reena Mathur (2021) Animal Behaviour, 6th Edition, Rastogi Publication.
- Kumar, V. (2002). Biological Rhythms: Narosa Publishing House, Delhi/ Springer -Verlag, Germany.

Reference Books Recommended –

- McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited,London, UK.
- Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6thedition) Cambridge, University Press, UK
- Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
- Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition)Sinauer Associate Inc., Massachusetts, USA.
- Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009) Chronobiology BiologicalTimekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.

Online Resources–

- **https://g.co/kgs/TGgyveE**
- **https://www.researchgate.net/profile/Atanu-Pati/publication/278157972_Chronobiology_The_Dimension_of_Time_in_Biology_and_Medicine/links/557c8b1208aec87640db4e73/Chronobiology-The-Dimension-of-Time-in-Biology-and-Medicine.pdf**
- **https://jmpas.com/admin/assets/article_issue/1643653535JMPAS_JANUARY_-_FEBRUARY_2022.pdf**
- **https://www.amazon.in/Concise-Book-Animal-Behaviour-Chronobiology/dp/819580571X**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20** +**20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

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COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Honors/ Honors with Research)*			**Semester - VIII**	Session: **2024-2025**
1	**Course Code**	**ZOSE-10P**		
2	**Course Title**	**Behaviour and Chronobiology**		
3	**Course Type**	**Discipline Specific Elective Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Learn a wide range of practical knowledge about the animal behavior. ➢ Develop skills, to understand the response of animals according to stimuli in lab. ➢ Objectively understand and evaluate information about animal behaviour and learn to form the ethogram. ➢ Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the surroundings. ➢ Consider and evaluate behaviour of animals, including Human in the nature.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	➢ Orientation of an animal in response to stimulus: To study geotaxis in earthworm and phototaxis in insect larvae. ➢ Constructing an Ethogram. ➢ Demonstration of learning behaviour in wasps to locate their burrow by using landmarks. ➢ Chemical communication in ants. ➢ Study of selective predation of coloured prey items through video/charts. ➢ Predatory behaviour of a carnivorous animal. ➢ Nests and nesting habits of the birds and social insects. ➢ Study the behavioural responses of wood lice to dry and humid conditions. ➢ Study of mimic animals in nature and take photographs. ➢ Study of circadian functions in humans (daily eating, sleep and temperature patterns). ➢ Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report. ➢ Group discussion or Seminar presentation on related topics. ➢ An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned behavioural patterns.	**30**
Keywords	*Phototaxis, geotaxis, Predatory behavior, wood lice, circadian functions, temperature pattern, ethogram*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

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- Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009) Chronobiology BiologicalTimekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/1fvtujeiyjw?e=0|*|||**
- **http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/7j0mtol4jrc?e=11|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS: