KU3DSCZOO202- ETHOLOGY AND EVOLUTION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
3	DSC	200	KU3DSCZOO202	4	60

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture/Tutorial	Practical	CE	ESE	Total	
4	-	30	70	100	2

Course Description:

Going through this course on Evolution & Ethology, students develop an understanding about the processes and patterns of biological evolution across different scales, from molecular changes within genes to the diversification of species over millions of years. And students also explore how organisms have adapted to their environments through natural selection, genetic drift, mutation, and other mechanisms, leading to the incredible diversity of life on Earth. The course also aims to give an elaborate account on the various types & patterns of animal behaviours in their natural environment. Several types of animal communications, along with most pioneering studies trigger curiosity among students.

Course Prerequisite:

Course Outcomes:

	Expected Outcome	**Learning Domains**
CO1	Recall key concepts and terminology related to evolution and ethology	U
CO2	Comprehend the theories and methodologies used in ethological research to study animal behaviour in natural and captive settings	U
CO3	Apply evolutionary principles to analyse and interpret specific behaviours observed in animals, considering how these behaviours contribute to their survival and reproductive success	A
CO4	Critically evaluate scientific literature and experimental data related to evolution and ethology, identifying strengths, weaknesses, and gaps in research methodologies and conclusions	E

****Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5
CO1	1	1	0	0	0
CO2	1	1	2	0	1
CO3	2	1	3	1	3
CO4	1	0	2	0	0

COURSE CONTENTS

Module I: MODERN CONCEPTS OF EVOLUTIONARY FORCES (12 hours)

Unit I

1.1 Modern ideas on origin of life - naked gene hypothesis RNA world theory.

1.2 Research on Extra-terrestrial life

1.3 Post Darwin Biology – modern synthesis – beyond modern synthesis

Unit II

1.4 Genetics to Genomics and evolution

1.5 Genetic basis of evolution, genetic drift, Hardy-Weinberg equilibrium, punctuated Equilibrium.

1.6 Molecular evolution -Neutral theory of kimura, concept of molecular clock, mitochondrial eve and Y chromosomal Adam, molecular phylogeny, selfish genes, C value paradox.

Unit III

1.7 Long-term experimental evolution project with *E. coli*

1.8 Epigenetics

1.9 Evo-devo (Evolutionary development biology); Ancient DNA (aDNA); Horizontal gene transfer

1.10 Isolation and isolating mechanisms of speciation

1.11 Mimicry and evolution

1.12 Microevolution and macroevolution

1.13 Evolution of cooperation – kin selection and reciprocity

Module II: HUMAN EVOLUTION (12 hours)

Unit I

2.1 Introduction, development of our ideas on human evolution (2hrs)

2.2 Early primates - Dryopithecus and Ramapithecus

2.3 The fossil record of human evolution

Unit II

2.4 Bipedalism and adaptations for locomotion

2.5 Diet, dentition, and feeding strategies in human evolution

2.6 The emergence of Homo habilis and Homo erectus

2.7 The Neanderthals: Morphology, behaviour, and extinction theories

Unit III

2.8 Modern human origins (Homo sapiens) - "Out of Africa" theory; Behavioural modernity: Language, art, and culture in early Homo sapiens; Human evolution and climate change

2.9 Future of human evolution - ethical considerations and potential changes

Module III: ETHOLOGY (12 hours)

Unit I

3.1 Definition and History of ethology -1973 Nobel prize in Physiology)

3.2 Motivation and models of motivation.

3.3 Types of behaviours – innate and learnt. Types of learning with examples

Unit II

3.4 Patterns of behaviours – types of rhythms, navigation, homing instinct, hibernation, aestivation

3.5 Animal communication – types; Pheromones- types with examples; insect pheromones, mammalian pheromones; human pheromones.

3.6 Hormones and their action on behaviour (aggressive and parental behaviour).

Unit III

3.7 Sociobiology: advantages and specialties of animal societies. Social life in insects - (eg. honeybees, ants and termites-brief description with thrust on behavioural aspects of each caste); Social life in mammals (eg. monkey, elephant)

Module IV: POPULAR DISCUSSIONS AND DEBATES ON EVOLUTION

(12 hours)

1. Intelligent design and creation research
2. Teaching evolution - the Scopes trial, current global status
3. Social Darwinism debates; Biology of caste and gender
4. Popular Publications – brief accounts
    a) "The Origin of Species" by Charles Darwin
    b) "The Selfish Gene" by Richard Dawkins
    c) "The Greatest Show on Earth: The Evidence for Evolution" by Richard Dawkins
    d) "Why Evolution Is True" by Jerry A. Coyne
    e) "Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body" by Neil Shubin
    f) "The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution" by Richard Dawkins
    g) Darwin's Dangerous Idea: Evolution and the Meanings of Life" by Daniel C. Dennett
    h) "Sapiens: A Brief History of Humankind" by Yuval Noah Harari
    i) **"**Homo Deus: A Brief History of Tomorrow" by Yuval Noah Harari

Teacher Specific Module	**12 hours**
Directions: **20 percent of the content can be modified by the course teacher**	

Essential Readings:

1. Organic Evolution- Veer Bala Rastogi. Med tech (A division of Scientific International)
2. Andrews. M.I and Joy, K.P. 2003. Environmental biology, evolution, Ethology and Zoogeography. St. Mary's press and book depot. Changanassery.
3. Aubrey Manning & Dawkins: An Introduction to Animal Behaviour; Cambridge.

4. Boulenger, E.G. Animal behaviour, 1994, Atlantic Pub.& distributors.
5. Darwin, C.: The Origin of Species, 6e. OUP.
6. Dobzhansky Th. (1964): Genetics and the Origin of Species. Columbia University Press

Assessment Rubrics:

Evaluation Type		**Marks**
1. End Semester Evaluation		70
2. Continuous Evaluation		30
Continuous Evaluation		
Theory	Method of Assessment	Marks
a)	Test paper I	6
b)	Test paper II	6
c)	Viva-Voce	6
d)	Assignment	6
e)	Seminar	6
	Total – 30 marks	