Course Code: ZOO- 426 **Course Title: Evolutionary Biology**
Number of Credits: 2
Effective from AY: 2020 -21

Prerequisite for the Course:	Basic working knowledge of diversity, cell biology, genetics and classical evolutionary biology.	
Objectives:	This course develops major concepts in evolutionary biology, including theories, unicellular/multicellular evolution, evolutionary history and evolutionary time scale. This course also provides a better understanding of population genetics, evolutionary forces and speciation. Additionally, this course throws light on aspects of molecular evolution along with evolutionary models.	
Content	**Module 1:** **Emergence of evolutionary thoughts, Evolutionary theories and evidences:** Contributions of Lamarck, Darwin, Darwin-Wallace postulates, concepts of variation, adaptation, struggle, fitness and natural selection; Spontaneity of mutations; The evolutionary synthesis, limitations of Darwinism, Neo Darwinism.	3 hrs
	Origin of cells and unicellular evolution: Origin of basic biological molecules, Abiotic synthesis of organic monomers and polymers, Concept of Oparin and Haldane, Experiment of Miller (1953), The first cell, Evolution of prokaryotes, Origin of eukaryotic cells, Evolution of unicellular eukaryotes.	3 hrs
	Paleontology and Evolutionary History: Overview of evidences - Paleontological, Embryological, Comparative morphological, Anatomical, Genetics and Cytological, Molecular Biological evidences.	2 hrs
	The Evolutionary time scale: Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo, Human evolution.	4 hrs
	Module 2 **Population genetics**: Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; **Evolutionary forces that affect the allelic frequencies:** Mutation, Migration, Selection - Stabilizing selection, Directional selection, disruptive selection, Balancing selection, Frequency dependent selection, Density dependent selection, Group and kin selection, Selection coefficient, Selective value, Selection in natural Populations, Genetic drift, Nonrandom mating.	4 hrs

	Hybridization and speciation: Concept of species and models of speciation based on distribution sympatric, allopatric, stasipatric, genetic drift, genetic revolution, genetic transilience, Founder-flush theory, phylogenetic gradualism, punctuated equilibrium, hybridization, adaptive radiation, isolating mechanisms. **Molecular Evolution:** Molecular phylogeny, neutral theory, molecular clock. **Creation and evolution models.**	3 hrs 3 hrs
Pedagogy:	Lectures/Tutorials/Videos/Assignments/Group discussion/Self-study.	
Learning Outcome:	1. Understand in detail the various concepts of evolutionary biology such as theories, history and evidences. 2. Study the time scale and understand stages of life formation and evolution. 3. Learn about the intricacies of population genetics in evolution. 4. Understand the various processes related to evolution. 5. Knowledge about molecular evolution, the field that links various aspects in zoology.	
References /Reading	1. Ferguson A (1980): Biochemical Systematics and Evolution, Blackie Publ., London. 2. Futuyma DJ (1979): Evolutionary Biology, 3rd Edition, Sinauer Associates, New York. 3. Futuyma DJ (2005): Evolution, Sinauer associates, New York. 4. Ridley M (1992): Evolution, 3rd edition, Blackwell Publishers, New York. 5. Rose MR and Mueller LD (2006): Evolution and Ecology of the Organism, Prentice Hall, New York. 6. Barton NH, Briggs DEG, Eisen JA, Goldstein AE, Patel NH (2007): Evolution, Cold Spring Harbor Laboratory Press, New York, USA. 7. Hall BK and Hallgrimsson B (2013): Evolution, Jones and Bartlett Publisher, Sudbury, USA . 8. Mayr E (2001): What Evolution Is, Basic Books, New York, USA.	