

ADVANCE ZOOLOGY IV (EVOLUTION AND PRINCIPLES OF SYSTEMATICS)

CREDIT HOURS: 3+1

Objectives:

- The course is designed to provide in depth knowledge or origin of life, and about forces responsible for evolutionary changes.
- The students will be taught basic rules and regulations about the identification and naming of organisms.

Note: Evolution and Principles of Systematic Zoology 60% and 40% weightage, respectively. Three questions from Evolution and two questions from Systematic will be attempted by the students.

Course Contents

Evolution: The nature and origin to life. Evidences of evolution. (molecular, embryological & paleontological). Theories to explain the diversity of life - Modern synthetic theory. Factors initiating elementary evolutionary changes (micro-evolution) by changing gene frequencies, mutation pressure, selection pressure, immigration and crossbreeding, genetic drift. Role of isolation in evolution. Factors of large evolutionary changes (macro/mega evolution)- allometry, orthogenesis, adaptive radiation.

Modern concept of Natural Selection: Levels of selection, selection patterns, laboratory and field example regarding action of Natural Selection. Action of Natural Selection leading to convergence, radiation, regression and extinction, Batesian mimicry, Mullerian mimicry. Sexual selection: Darwin's concept, Fisher's view, Zahavi's handicap theory. Recapitulation theory, Trend and rates in evolution.

Systematic Zoology: Contribution of systematics to Biology: History of Taxonomy (Downward classification, upward classification, impact of the origin of species, population systematics, current trends); Microtaxonomy, phenon, Taxon; Taxonomic categories: specific category, infraspecific category, higher categories; species concepts (Typological concept; nominalistic concept, Biological concept, evolutionary concept), species mate recognition concept; non- dimensional species concept; Multidimensional species concept; Cohesion species concept; Difficulties in the application of biological species concepts; polytypic species, subspecies, super species, sibling species; study of major type of variation within a single population. Speciation and taxonomic decision, various types of characters, cladistic analysis, Macrotaxonomy; different kinds of taxonomic characters; Taxonomic collection and identification; definitions of Synonym, Homonym, Keys; Evolution of the theory of Nomenclature; interpretation and application of the code (stability, priority, first revisor principle) range of authority of code; concept of availability, type method formation of specific names.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended Evolution

Dobzhansky, T. (1951). *Genetics and the Origin of Species*, New York: Columbia University Press.

Dobzhansky, T., Ayala, F. J., Stebbins, G. L., & Valentine, J. W. (1973). *Evolution*. W.H. Freeman and Company.

Mayr, E. (1965). *Populations, Species and Evolution*. Harvard University Press.

Moody, P. A. (1989). *Introduction to Evolution*. New York: Harper and Row Publishers.

Ridley, M. (1993). *Evolution*. Blackwell Scientific Publications.

Strickberger, M. W. (2000). *Evolution*. Jones & Barrett Publishers.

Systematic Zoology

Heywood, V. H. (1975). *Taxonomy and Ecology*. London: Academic Press.

Mayer, E. & Asblock, P. D. (1991). *Principles of Systematic Zoology*. New York: McGraw Hill.

Mayer, E. (1994). *Principles of Systematic Zoology*. New York: McGraw Hill.

Mayr, E. (1985). *Animal Species and Evolution*. Harvard University Press.

Whili, M. J. D. (1978). *Modes of Speciation*. San Francisco: W.H. Freeman and Co.

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PRACTICALS

1. Study of preserved invertebrate species and their classification upto class level.
2. Collection, preservation and identification of common species with the help of keys. Methods of statistical analysis of samples from populations T-test, Analysis of variance etc.
3. Preparation of keys for the identification of specimens.

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