

Core VII

Paleontology

Course Objectives

- To introduce the principles and methods of paleontology
- To expose students to fossils, their mode of formation, classification and application in paleontological dating.
- To use fossil records for reconstruction of the evolutionary history of organisms.
- To discourse on ancient environments and climate change from fossil evidences including mass extinctions.

Learning Outcomes:

- Understand the principles of paleontology which include fossil identification, excavation techniques, and paleontological dating.
- Apply these techniques to analyze and interpret fossil records.
- Analyze and interpret the fossil record to reconstruct the evolutionary history of organisms and understand past ecosystems.
- Infer about ancient environments, climate change, and mass extinctions from fossil records.

Unit - I: Introduction to Paleontology

Fossilization – conditions, processes (Taphonomy) and modes. Taxonomic hierarchy and Nomenclature. Concept of biostratigraphy, geological time scale and organic evolution.

Unit - II: Invertebrate Fossils

Introduction to important invertebrate groups (e.g. Trilobita, Mollusca) and their biostratigraphy significance. Morphology and evolution of Brachiopods, Pelecypods, Cephalopods & Gastropods, Trilobites, Echinoids, Corals and Graptolites

Unit - III: Vertebrate Paleontology

Origin and division of vertebrates and major stages of evolution. Reptiles and mammals and their evolution from fossil records. Siwalik fauna, Evolution of horse, elephant and homo sapiens.

Unit - IV: Paleobotany & Palynology

Gondwana flora and their significance. Separation of spores and pollens. Utility of palynological studies in different fields.

Practical:

- Identification of important invertebrate and plant fossils;
- Drawing and labeling of fossils;
- Arrangement of fossils in geochronological order;

Textbook:

- ✓ Foote, M. and Miller, I.A. (2007) *Principles of Paleontology*. W. H. Freeman and company
- ✓ Clarkson, E. N. K. (2012) *Invertebrate paleontology and evolution, 4th Edition*, Blackwell Publishing.

Suggested readings:

- ✓ Raup, D. M., Stanley, S. M. Freeman, W. H. (1971) *Principles of Paleontology*
- ✓ Benton, M. (2009). *Vertebrate paleontology*. John Wiley & Sons.
- ✓ Shukla, A.C. & Misra, S. P. (1975). *Essentials of paleobotany*. Vikas Publisher
- ✓ Armstrong, H. A., & Brasier, M.D. (2005) *Microfossils*. Blackwell Publishing.
- ✓ Benton, M.J. and Harper, D.A.T. (2009) *Introduction to Paleobiology and the Fossil Record*. Wiley-Blackwell