

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
GE-3 Fossils and Applications (L3, P1)	4	3	0	1	12 th Pass	Nil

Learning Objectives

This course on fossils and applications is to provide students basic but important knowledge about fossils, their preservation in rocks and different groups of invertebrate, vertebrate and plant fossils. This will impart knowledge and make them aware about utility of the fossils in relative dating of sedimentary rocks and their importance for palaeoecological, palaeoenvironmental, palaeobiogeographical reconstruction.

Learning outcomes

After successful completion of this course, students will be able to understand about different types of life forms that existed in the geological past. Students will be able to appreciate the evolutionary trends of the important fossil groups and their role to understand the Earth's history. They will learn usage of fossils to reconstruct paleoenvironments, ecosystems, past-climate and paleogeographic setting. The students will learn the sampling and processing techniques of various fossil groups and their applications in hydrocarbon exploration and correlation of coal seams.

SYLLABUS OF GE-3

Theory (45 hours)

UNIT – I (9 hours)

Detailed contents

Introduction to fossils: Definition of fossil, fossilization processes (taphonomy), taphonomic attributes and their implications, modes of fossil preservation, role of fossils in development of geological time scale and fossil sampling techniques.

UNIT – II (9 Hours)

Detailed contents

Species concept: Definition of species, species problem in palaeontology, speciation, methods of description and naming of fossils, code of nomenclature.

UNIT – III (9 hours)

Detailed contents

Introduction to various fossils groups: Brief introduction of important fossil groups: invertebrate, vertebrate, microfossils, spore, pollens and plant remains. Important fossiliferous horizons of India

UNIT – IV (9 Hours)

Detailed contents

Application of fossils: Principles and methods of paleoecology, application of fossils in the study of paleoecology, paleobiogeography and paleoclimate; Role of fossils in palaeoenvironmental reconstructions.

UNIT – V (9 Hours)

Detailed contents

Societal importance of fossils: Implication of larger benthic and microfossil in hydrocarbon exploration: identification of reservoirs and their correlation. Application of spore and pollens in correlation of coal seams, spore and pollens as indicator of thermal maturity of hydrocarbons reservoirs, fossils associated with coal deposits, fossils as indicators of pollution.

Practical Component- (30 Hours)

Lab exercises based on different fossil assemblages in geological records and their utility, identification of different fossils, time record, morphology, evolution, and response to changes in climate and paleogeography

Essential/recommended readings

Clarkson, E.N.K.1998. Invertebrate Paleontology and Evolution, George Allen &Unwin

Prothero, D.R. 1998. Bringing fossils to life - An introduction to Paleobiology, McGraw Hill.

Suggestive readings

Clarkson, E.N.K.1998. Invertebrate Paleontology and Evolution, George Allen &Unwin

Prothero, D.R. 1998. Bringing fossils to life - An introduction to Paleobiology, McGraw Hill.

Benton, M.J. 2005. Vertebrate Palaeontology (3rd edition), Blackwell Scientific, Oxford.

Colbert's Evolution of the Vertebrates: A History of the Backboned Animals Through Time, Edwin H. Colbert, Michael Morales, Eli C. Minkoff, John Wiley & Sons, 1991.

Benton, M.J. & Harper, D.A.T. (2016). Introduction to Palaeobiology and the fossil record. Wiley.

Jones, R.W. (2011). Applications of Palaeontology - Techniques and Case Studies

Raup, D.M. & Stanley, S.M. (1985), Principles of Paleontology, W.H. Freeman and Company

Shukla, A. C. & Mishra, S.P. (1982). Essentials of Palaeobotany