

COMMON POOL OF GENERIC ELECTIVES

One GE from GE pool (GE-6): Evolution of life through time (L3, T1)

Credit distribution, Eligibility and Pre-requisites of the Course GE-5

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
GE-6 Evolution of life through time (L3, T1)	4	3	1	0	12th Pass	Nil

Learning Objectives

The main objective of the course is to make the student aware about the evolution of life through geological time from simple prokaryotic to complex multicellular life forms, and the role of geological processes and climatic events in shaping the evolution of life on the Earth.

Learning outcomes

On completion of the course, the student will be able to learn how fossilization processes operate in nature and what early planetary conditions led to the origin and evolution of early life. The student will also be able to understand mass extinction events in the Phanerozoic Era and their causes, and how various geological and climatic events influenced the evolution of life and how life itself has influenced the geological processes.

SYLLABUS OF GE-6

Theory (45 hours)

UNIT – I (9 Hours)

Detailed contents

Life through ages: Fossilization processes and modes of fossil preservation, exceptional preservation; Geological Time Scale with emphasis on major bio-events.

UNIT – II (9 hours)

Detailed contents

Geobiology: Biosphere as a system, processes and products; Biogeochemical cycles; Abundance and diversity of microbes, extremophiles; Microbes-mineral interactions, microbial mats.

Origin of life; possible life sustaining sites in the solar system.

UNIT – III (9 Hours)

Detailed contents

Archean life: Earth's oldest life, the oxygen revolution and radiation of life.

Proterozoic life: The Garden of Ediacara and the evolution of metazoan life.

UNIT – IV (9 Hours)

Detailed contents

Palaeozoic Life: The Cambrian Explosion of Life; Biomineralisation and the fossil record.

Palaeozoic Marine Life; Origin and progression of vertebrates; Early adaptations of plants to terrestrial life.

Mesozoic Life: Life after the largest (P/T) mass extinction, life in the Jurassic seas; Origin of mammals; Rise and fall of dinosaurs; Origin of birds; and spread of flowering plants.

UNIT – V (9 Hours)

Detailed contents

Cenozoic Life: Radiation of placental mammals following K/Pg mass extinction; Evolution of modern grasslands and co-evolution of hoofed grazers; Palaeocene-Eocene Thermal Maximum (PETM) deep time analogue for modern greenhouse state; Back to water – Evolution of Whales; The age of humans; Hominid dispersals and climate setting

Tutorial (30 hours)

Students in different batches or groups will be given exercises to prepare short reports about the life evolution and extinction through different geological times on Earth.

Essential/recommended readings

Stanley, S.M. & Luczaj, J.A. (2014). Earth System History (4th Edition), W.H.Freeman (Macmillan)
Cowen, R. (2000). History of Life. Wiley-Blackwell.
Benton, M.J. & Harper, D.A.T. (2016). Introduction to Paleobiology and the fossil record. Wiley

Suggestive readings

Stanley, S.M. & Luczaj, J.A. (2014). Earth System History (4th Edition), W.H.Freeman (Macmillan)
Cowen, R. (2000). History of Life. Wiley-Blackwell.
Benton, M.J. & Harper, D.A.T. (2016). Introduction to Paleobiology and the fossil record. Wiley
Canfield, D.E. & Konhauser, K.O. (2012). Fundamentals of Geobiology, Blackwell.
Suggested Reading:
Cowen, R. (2000). History of Life. Wiley-Blackwell.
Lumine, J.I. (1999). Earth-Evolution of a Habitable World, Cambridge University Press.
Lieberman, B.S. & Kaesler, R. (2010). Prehitoric Life-Evolution and the Fossil Record, Wiley-Blackwell.
Lieberman, B.S. & Kaesler, R. (2010). Prehitoric Life-Evolution and the Fossil Record. Wiley-Blackwell.
Cockell, C., Corfield, R., Edwards, N. & Harris, N. (2007). An Introduction to the Earth-Life System Cambridge University Press.