

# **EARTH AND PLANETARY SCIENCES**

**IDC-202: EARTH AND PLANETARY SCIENCES (3 credits, 36 hrs)**

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## ***Part - I The planet today***

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- 1 Introduction about our Solar neighborhood. Introduction to orders of magnitude and scales of time and space and how they are measured at the extremes. Particularly, measurement of cosmic distances - ended with red shift, age of the Universe. Time - absolute and relative and cosmic time scales. Other extreme - time and spatial scale of atomic vibrations, how they help us do spectroscopy and obtain the composition of the Sun, and hence the solar system. Kinds of forces and their magnitudes in the Earth. Time scales of processes - days to millions of years.
  - 2 Planet Earth - The structure - from core to the upper levels of magnetosphere. The interior structure, distribution of pressure and temperature (with heat inside the earth). Basic chemistry (in terms of abundance of elements) physics (magnetic field, gravity field, mechanical properties – rheology).
  - 3 The Surface we live on - Geomorphologic features and processes. Sediments and sedimentary processes. The Oceans. The Atmosphere, The Biosphere
  - 4 Building Blocks of Earth - Minerals, rocks, water, melts and the atmosphere
  - 5 Some tools – Basics of geological maps and their interpretation
  - 6 Plate tectonics today and its consequences - Earthquake, Volcanoes, Mountain Building, Tsunami, Mineral Deposits
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## ***Part - II The formation and evolution of the planet – the story of how we got here***

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- 1 From Stars, to Supernova to solar systems. Nebular condensation and planet formation. Meteorites - what they tell.
  - 2 Hadean Earth (>3800 Myrs): Core formation, Isotopes, Hf-W Isotopes and how these lead on to moon formation
  - 3 Archean (3800 - 2500 Myrs) - Archean tectonics, origin of first crust, differentiation. Crustal Growth - how to measure, what are the evidences.
  - 4 Archean to Proterozoic transition, ca. 2500 Myrs - Origin and evolution of life, how various geological factors contributed, role of water etc.
  - 5 Origin of Atmosphere and the oxygen revolution.
  - 6 Archean to Proterozoic (2500 - 500 Myrs) – Earth in
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Transition, Differentiation into Mantle, Crust, Continental Crust  
etc. and stabilization of the plate tectonic regime we saw  
under (6) above

7 Origin of Life - development of the genetic components.

8 Dynamics of the Earth's Atmosphere

9 Sustenance of Life and resources – Environment today;  
problems and future perspectives

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