# MGE 508: Ocean and Atmospheric Science (Open Elective)

## MGE 457: GEOSCIENCES (Open Elective Paper)

**Skills, employability and entrepreneurship:** This paper is useful to the sister department students of the Earth Science, such as chemistry, physics, life sciences, statistics, computer as well as computing sciences. Usually science students other than earth science qualify NET exams/interviews in the institutes join earth science related organizations, and they have to learn earth, atmosphere and ocean science in their area of research. However, with the knowledge of this subject (earth science), students can perform better in their career thereby utilizing the intension of studying the interdisciplinary science. Students have employability in many branches of science in different government organizations and MNCs.

### Oceanography

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| **Unit 1** | Physical Oceanography - Physical properties of sea water. Waves, tides and currents. Coastal protection and management. | 6 hrs |
| **Unit 2** | Chemical Oceanography - Composition of seawater: Constancy of composition of seawater and its limitations. Distribution of elements in seawater and biogeochemical processes regulating the composition and climate change. Residence times of elements in the ocean and its importance. Tracers for understanding the present and past oceanographic processes. | 6 hrs |
| **Unit 3** | Biological and Geological Oceanography - Introduction, classification of marine life. Primary, secondary and tertiary production. Planktonic and benthic life in the ocean. Diversity index and its use in biological oceanography, food-web. Geological oceanography: Origin and evolution of the ocean floor. Continental drift, sea-floor spreading and plate tectonics. Ocean morphological features, development and significance. | 6 hrs |
| **Unit 4** | Marine mineral resources: Distribution and classification of minerals of economic importance in different oceanographic settings: Seawater as a source of elements/minerals. Placer and heavy mineral deposits, petroleum and coal, phosphorites, gas hydrates, poly-metalic nodules, metals enriched crusts, hydrothermal and metalliferous sediments.<br>Interactive sessions of teaching to enhance students-teacher interactions through hands-on demonstrations and exercises in the recent advancement of the subject related to the curriculum. | 6 hrs |

### Atmospheric Science

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| **Unit 5** | Introduction to atmospheric Science - Structure and composition of the atmosphere. Processes regulating the composition of the atmosphere, and human interference - Greenhouse effect, ozone hole and global warming. Introduction to meteorology and elements of the weather system. | 8 hrs |

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| **Unit 6** | Climatology and Paleoclimatology: Difference between weather and climate. Climate and its principles of classification. Climate change, climate cycles and tools/proxies for studying paleoclimatology.<br>Interactive sessions of teaching to enhance students-teacher interactions through hands-on demonstrations and exercises in the recent advancement of the subject related to the curriculum. | 8 hrs |

**List of Reference:**


1) Physical Geology - C. W. Montgomery-Wm. C. Brown Publishing Co. Ltd (1993).
2) Physical Geology - A. N. Strahler.
3) Meteorology - William L. Donn (1975) - McGraw-Hill Book Co., New York.
4) An introduction to Dynamic Meteorology - J. R. Holton (1992) - III Ed, Academic Press.
5) Carol M. Lalli and Timothy R. Parsons. Biological Oceanography: An
6) Introduction (1997).
7) Miller, C.B. (2004) Biological Oceanography. Blackwell Publishers. 416pp.
8) Paul R. Pinet (1992) Oceanography: An introduction to the Planet Oceanus, West Publ., Co.571pp.
9) Thruman, H. V. (1994) Introductory Oceanography. 7th Ed. Macmillian Pub., Co.
10) George Karleskint, Richard Turner, James Small, (2012) Introduction to Marine Biology Publisher: Brooks Cole, 512 pp.
11) Fasham, Michael J.R. (2003) Ocean Biogeochemistry. The Role of the Ocean Carbon Cycle in Global Change Series.
12) Carter, R.W.G., and Oxford, J.D. (1984) Coarse clastic barrier beaches: a discussion of the distinctive dynamic and morpho-sedimentary characteristics. Marine Geology 60: 377-89.
13) Komar, P. D., (1976) Beach Processes and Sedimentation, Prentice-Hall. 429p.
14) Reddy M.P.M. (2001) Descriptive Physical Oceanography, AA Balkema Press. 440p.
15) Seibold E.: The seafloor (1982).
16) An Open University Course Team (1989): Seawater: Its composition, properties and behaviour (pp.33)
17) Bhandari, L. L. and Venkatachala, B.S. (Ed.): Petroliferous basins of India.
18) Bjorlykke K. (1984): Sedimentology and Petroleum Geology.
19) Abdulin, F.: Petroleum of Oil and Gas (1985).
20) Sidorov, N. A.: Drilling Oil and Gas wells (1985).
21) G.S. Roonwal: The Indian Ocean: Exploitable Mineral and Petroleum Resources (1986).