MGH 502: OCEANOGRAPHY – II

Skills, employability and entrepreneurship: These are similar to the above mentioned ones with an emphasis on the geological and biological processes taking place in the oceans, and their exploration. Students have chance to go on ocean expedition and exit with course have skills to work in organizations related to ocean and well as Navy including the R & D Labs. and educational institutions.

Geological Oceanography

Unit 1	Introduction to Geological Oceanography. Classification of coasts: Valentin's Coastal Classification. Description of Beaches andpalaeobeaches, Sea Stacks, Sea Caves and Notches. Ocean floor morphology: Description of Continental shelf, slope, rise and abyssal plains. Mid-oceanic ridge, Subduction zone and description of trenches, Ocean basins, Island arcs, Hot spots, Transform faults and Triple junction. Plate tectonics and Neotectonic processes.	8 hrs
Unit 2	Factors controlling the deposition and distribution of oceanic/marine sediments - Biogenous, Cosmogenous, Hydrogenous, Terrigenous and Authigenic. Tectonic evolution of the ocean basins. Reconstruction of monsoon variability by using marine proxy records. Opening and closing of ocean gateways and their effect on circulation and climate during the Cenozoic era. Sea-level change and methods to determine paleo-sea surface temperature.	8 hrs
Unit 3	Ocean-energy resources:Introduction, importance, general characteristics; Tidal energy-potential, harnessing, special features of tidal power plants in operation/under active consideration; the Indian scenario; Wave energy-potential. Special characteristics, the Indian scenario-potential, IIT-Madras wave energy programme "oscillating water column" chamber, Ocean Energy Thermal Conversion- Principle, factors affecting OTEC, special features, land-based/grazing types of plants.	6 hrs
Unit 4	Definition, characteristics, marine geological setting, genesis and occurrence of Metalliferous sediments**,** Phosphorites (including mineralogy and geochemical environments of modern deposition). Marine mineral resources:Importance, biotic and abiotic. Polymetallic nodules, Cobalt and other related crusts, Hydrothermal sulfide deposits including black and white smokers.	6 hrs
Unit 5	Placers: placer minerals, classification, environments of placer mineral deposition - rivers, beaches and offshore areas; Sand as a resource. Law of the Sea Treaty: Introduction, UNCLOS I, II and III, LOS Treaty – demarcation of various zones (Territorial Sea, Contiguous Zone, Exclusive Economic Zone, Legal Continental Shelf, High Sea,	6 hrs

	International Area of the Seabed), rights of coastal nations. International Seabed Authority. 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.	

Biological Oceanography

Unit 6	Introduction:Physico-chemical factors affecting marine life – light, temperature, salinity, pressure, nutrients, dissolved gases; adaptation and biological processes. Diversity index and its use in biological oceanography. Food-web. Case-I and Case-II water characteristics. Human impacts on marine communities; impacts of climate change on marine biodiversity. Impact of pollution on marine environments including fisheries.	6 hrs
Unit 7	Classification of the marine environment and marine organisms. Primary and secondary production; factors controlling phytoplankton and zooplankton abundance and its diversity. Plankton and harmful algal blooms. Nekton and introduction to fishery oceanography, benthos, coral reefs, foraminifera, diatoms, ostracods and dinoflagellates. Benthic organisms, coastal- marine communities. A glimpse of ecology – estuaries, coral reefs and mangrove, deep-sea including hydrothermal vent communities.	6 hrs
Unit 8	Outline of microbenthos, meiobenthos and macrobenthos in the ocean. Chlorophyll distribution in oceans. Sampling methods and introduct- ion to Hyperspectral spectroradiometer, use of spectrophotometer. Secchi disc, D.O meter, Salinometer etc. Multiparametric Ocean probes to record salinity, temperature, chlorophyll, Dissolved oxygen. 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

List of References:

1) Pinet, P. R. (1992) Oceanography: An introduction to the Planet Oceanus, West Publ., Co. 571p.
2) Komar, P. D. (1976) Beach Processes and Sedimentation, Prentice-Hall. 429p.
3) Reddy M.P.M. (2001) Descriptive Physical Oceanography, AA Balkema Press. 440p.
4) Seibold, E. and Berger: The seafloor (1982).
5) Horne, R.A. (1969) Marine Geology; the structure of water and the chemistry of the hydrosphere.