Programme: M. Sc. (Marine Sciences)
Course Code: MSO 264Title of the Course: Remote sensing and its applications
Number of Credits: 04
Effective from AY: June, 2018-19

Prerequisites for the course:	Students undergoing course in any branch of Marine Sciences.
Objective:	All the coastal process is transient in nature. They are of either diurnal/weekly time scale. To deal with such variability the requirement is a method that would provide a synoptic coverage of the coastal and offshore regions. This is possible only by means of Remote sensing. Hence this emerging technology has been introduced as a course.

Content:	Principles of Electromagnetic radiation– Energy matter interactions –- Rayleigh scattering – Mie scattering – Non selective scattering - Radiative transfer in the atmosphere – Stfan's and Wien's displacement laws –Zenith and azimuth angles.	12 hours
	Optical remote sensing – bio-optical properties of sea water - Inherent and apparent optical properties - scattering - absorption-attenuation - diffuse attenuation – Remote sensing reflectance - Case I and Case II waters - radiative transfer in the water column.	12 hours
	Sun photometry - Beer-lambert's law - spectral variation of aerosol optical thickness - atmospheric correction - interpretation of ocean colour - spectral response of water as a function of organic and inorganic constituents - Analysis of suspended minerals, chlorophyll *a* and dissolved organic matter through OCM/MODIS data.	12 hours
	Thermal infrared remote sensing- Thermal infrared properties - Atmospheric windows - Thermal radiation laws - Emissivity - sea surface temperature retrieval through IR sensors - Active and passive microwave remote sensing - Satellite altimetry of sea surface topography. Sensor characteristics – MSS, GOES, AVHRR, CZCS, SeaWiFS, IKONOS, MODIS, OCM I and OCM - II, LISS -1, LISS-II, WIFS and PAN – Fundamentals of digital image processing – Image rectification – Image enhancement – linear stretching – supervised and unsupervised classification - Introduction to Geographic Information system.	12 hours
Pedagogy:	Being a new and an emerging field, it is necessary to have class room contact hours. Hence, it is a class room taught course. In addition, to get acquaint with the course,seminar topics on the applications of remote sensing are given to the students at the beginning.	
References/ Readings	1. Physical principles of remote sensing, 1990 – Rees, W.G., Cambridge Univ. Press, U.K. 2. Remote sensing optics and optical systems, 1980 – Slater, P.N., Addision Wesley Publ. Co. 3. Remote sensing and image interpretation (2nd edn), 1987 – Lillesand, T.M. and Kiefer, R.W., John Wiley and sons. 4. Remote sensing: Principles and interpretations (2nd edn), 1987 – Floyd and F. Sabnis Jr. W.H. Freeman and Co., New York. 5. Theory and application of optical remote sensing, 1989 – Asrar G., John Wiley & Sons. 6. Introduction to satellite oceanography, 1985 – Maul, G.A., Martinus Nijhoff Publ. 7. Advanced remote sensing from theory to applications (vol.1, 2 & 3), 1981 – Chlamys, F.T., Addision wisley Publ. Co. Inc., Canada. 8. Oceanography from space, 1987- Gover, J.A.R., Plenum Press, New York. 9. Remote sensing of atmospheres and oceans, 1980 - Deepak A., Academic press. 10. Satellite oceanography, 1985 - Robinson, I.S., John Wiley & Sons	
Learning Outcomes	Since the country is in advanced stage in the field of space Technology, the students opting for this course will be trained Manpower to carry forward Nation's need for human resources in the field of Remote sensing.	