

Programme: M. Sc. (Marine Sciences)

Course Code: MSO 265

Title of the Course: Remote Sensing and its applications Practical

Number of Credits: 02

Effective from AY: June, 2018-19

Prerequisites for the course:	Students undergoing course in any branch of Marine Sciences.
Objective:	This course is the practical component of the theory students learn. This involves satellite data processing for various applications of Ocean/earth/ atmosphere. In this course, students will be exposed to different satellite data, various corrections to be applied and finally image processing for a finished geophysical product.

Content: **Module - I** 24 hours
1. Field survey and laboratory analysis to generate apparent optical properties from case II waters

- using in-water radiometer, and profiles of salinity and temperature using conductivity, temperature and Depth (CTD) sensor, (16 hrs; Ref 1)
2. Generation of Inherent Optical properties (IOP) of optically active substances (OAS), namely absorption of chlorophyll-*a* (Chl-*a*), Chromophoric Dissolved Organic Matter (CDOM) and Total Suspended Inorganic Matter (TSM) from water samples collected during the field survey of case II waters (10 hrs; Ref 1)
 3. Simulation of remote sensing reflectance and water leaving radiance from case II waters (4 hrs; Ref 2)

Module – II

1. Simulation of remote sensing reflectance for each optically active substance and delineation of range of wavelengths susceptible to each OAS and development of empirical algorithms (10 hrs; Ref 3)
2. Generation of aerosol optical depth using sun-photometer and analysis of aerosol optical depth to estimate atmospheric turbidity parameter and Angstrom exponent (8 hrs; Ref 4,5,8)
3. Satellite data processing to map chlorophyll *a*, using ERDAS IMAGINE SeaDAS (12 hrs; Ref 6, 7 and 8)

24 hours

Pedagogy: This course is done through various programming to estimate Parameters followed by usage of different image processing packages. One such package student's use is SeaDAS software.

- References/ Readings**
1. Regional validation of MERIS CHLOROPHYLL products in North coastal waters (REVAMP) Protocol, based on NASA and colors protocols, 2002 - Tilstone, G.H, Moore, G.F, Sorensen. K, Doerffer. R, Rottgers, K.G, Ruddick. R, Psterkamp, P.V and Jorgensen, ENVISAT – 1
 2. Physical principles of remote sensing, 1990 – Rees, W.G., Cambridge Univ. press, U.K. 25
 3. Remote sensing: Principles and interpretations (2nd edn), 1987 – Floyd and F. Sabnis Jr, W.H. Freeman & Co., New York.
 4. Theory and applications of optical remote sensing, 1989 – Asrar, G., John Wiley & Sons.
 5. Introduction to satellite oceanography, 1985 – Maul, G.A., Martinus Nijhoff Publ.
 6. Advanced remote sensing from theory to applications (Vol.1, 2 & 3), 1981, Chlamys, F.T., Addison – Wesley Publ. Co. Inc., Canada.
 7. Oceanography from space, 1987 – Grover, J.A.R., Plenum Press, New York.
 8. Remote sensing of atmospheres and oceans, 1980 – Deepak, A., Academic Press.
 9. SBE plus CTD, User's manual www.seabird.com/pdf_documents/manuals/9_plus_017.pdf
 10. Regional Oceanography, an Introduction, 2nd edition, 2003 - Tomczak, Mattias and Stuart Godfrey J, , Daya Publishing house, Delhi.

Learning Outcomes Students will be thoroughly trained in different process of satellite Data so as to generate various geophysical products.