Programme: M. Sc. (Marine Sciences)
Course Code: MSC 262 **Title of the Course: Computational Methods in Oceanography Practical**
Number of Credits: 02
Effective from AY: June, 2018-19

Prerequisites for the course:	Degree of Bachelor of Science of this University or an examination of any other University recognized as equivalent.	
Objective:	To use mathematical /statistical knowledge to estimate ocean/atmospheric parameters and to learn to make computer programs for application in oceanography.	
Content:	**Module - I** 1. Programs illustrating use of Numeric constants & variables, Arithmetic operators & expressions, simple input and output statements, hierarchy of operations. (6hrs; Ref 1,2.3,4) 2. Programs illustrating use of logical expressions, integer, real & mix mode operations & library functions (6hrs; Ref 1, 2,3, 4) 3. Programs illustrating use of IF-ENDIF, IF-ELSE-ENDIF and IF-ELSEIF-ELSE-ENDIF (4hrs; Ref 1,2,3,4) 4. Programs illustrating use of DO loops, nested DO loops (4hrs; Ref 1, 2, 3, 4) 5. Programs illustrating use of one and two dimensional arrays (6hrs; Ref 1, 2, 3, 4) 6. Programs illustrating use of different types of FORMATS (4 hrs; Ref 1, 2, 3, 4) **Module -II** 1. Programs illustrating subroutines and reading/writing data from files - hard disk. (6hrs; Ref 1, 2, 3, 4) 2. Programs for computation of statistical parameters for analysis of oceanographic data. (6hrs; Ref 12,3,4,5) 3. Writing programs for sample data extraction and validating (6hrs; Ref 1, 2, 3, 4) 4. Use of statistical software for estimation of statistics/parameter of sample/population (2hrs; Ref 5) 5. Writing programs for data extraction, validating & generating horizontal sections of oceanographic property using software with different gridding method to ascertain the most suitable gridding method. (6hrs; Ref 1, 2, 3, 4 & Surfer software manual) 6. Writing programs for data extraction, validating & generating contour map for analysis of vertical & surface properties (4hrs; Ref 1, 2, 3, 4 & Surfer software manual).	24 hours 24 hours
Pedagogy:	Tutorials/ assignments/practical	
References/ Readings	1. Computer Programming in FORTRAN 90/95, 1997. V. Rajaraman, Prentice Hall of India, New Delhi. 2. Fundamental algorithms, 1985 – Knuth, D.E., Narosa Publ. House, New Delhi. 3. Theory and practice of programming, with FORTRAN, 1986 – Lipschutz, S & Poe, A., McGraw Hill Book Co., Singapore. 4. FORTRAN 90/95 for Scientists & Engineers, 1998 - S.J. Chapman, Mc-Graw Hill. 5. Statistical Methods, 2009 - S C Gupta,Sixth edition, Himalaya publishing House	
Learning Outcomes	Make computer programs involving mathematics, statistics methods for applications in oceanography/meteorology. Acquire computational and programming knowledge to deal with large data sets and generate programs. Plot global ocean /atmosphere data for specific spatial and temporal ranges.	