Programme: M.Sc. Marine Biotechnology
Course Code: MBO 184:
Title of the course: LAB VI - BIOINFORMATICS
Number of Credits: 1
Effective from: 2019-2020

Course Objectives	The aim is to provide practical training in bioinformatics and statistical methods including accessing major public sequence databases	
Learning Outcomes	On completion of this course, students should be able to: • describe contents and properties of important bioinformatics databases, perform text- and sequence-based searches, analyse and discuss results in the light of molecular biology knowledge; • explain major steps in pairwise and multiple sequence alignment, explain its principles and execute pairwise sequence alignment by dynamic programming; • predict secondary and tertiary structures of protein sequences; • Perform and analyse various statistical tools available to analyse the data.	
Content	**MODULE I** 1. Using NCBI and Uniprot web resources. 2. Introduction and use of various genome databases. 3. Sequence information resource: Using NCBI, EMBL, Genbank, Entrez, Swissprot/ TrEMBL, UniProt. 4. Similarity searches using tools like BLAST and interpretation of results. 5. Multiple sequence alignment using ClustalW. 6. Phylogenetic analysis of protein and nucleotide sequences. 7. Use of gene prediction methods (GRAIL/Genscan,/Glimmer). 8. Use of various primer designing and restriction site prediction tools. 9. Use of different protein structure prediction databases (PDB, SCOP, CATH). 10. Construction and study of protein structures using RASMOL/Deepview/PyMol. 11. Homology modelling of proteins. 12. Use of tools for mutation and analysis of the energy minimization of protein structures.	24 hours
References/ Reading	1. Bioinformatics:concepts skills and applications (2004).S.C. Rastogi, N. Mendiratta and P. Rastogi. 2. Bioinformatics: A modern approach . (2005) V.R. Srinivas. 3. Essential Bioinformatics (2006). J. Xiong. 4. Statistical methods in Bioinformatics: An introduction. (2005). W. Even and G. Grant 5. Bioinformatics: A Practical Approach 2007 Shui Qing (Chapman & Hall/CRC Mathematical and Computational Biology)	

	6. Bioinformatics, 3ed Paperback – 2009 by Andreas D. Baxevanis, B.F. Francis Ouellette Wiley Student Edition 7. Practical Bioinformatics Garland Science 1st Edition (2012) Michael Agostino 8. Bioinformatics Practical Manual (2015) by Mohammed Iftekhar , Mohammed Ghalib. Createspace Independent Pub	