Department of Bio Technology, Indian Institute of Technology Madras

Course title	**Data Structures and Algorithms for Biology**									Course No	**BT3051**			
Department	Bio Technology	New Credits	L	T	E	P	O	C	TH	Old Credits	L	T	P	C
			2	1		2	6	11			2		3	4
Offered for										Status	Modified			
Faculty	Chitra Babu									Type	Theory			
Pre-requisite skills										To take effect from				
Submission date	Date of approval by DCC		Date of approval by BAC							Date of approval by Senate				

Objectives:
To introduce the basics of algorithms and data structures (using Python), with particular emphasis on the paradigms important for biology.

Course Contents:
Introduction to Python; Introduction to algorithms: basics, order of growth classifications and asymptotic notation; Introduction to object-oriented programming; Basic data structures: stacks, queues, linked lists, trees, hash tables; Basic sorting algorithms: selection sort, bubble sort and insertion sort; Divide and conquer: mergesort, quicksort; Introduction to Dynamic Programming: edit distance and related problems, applications in sequence analysis; String matching algorithms; Advanced data structures for string matching: Suffix Tries, Suffix Trees; Regular Expressions and Parsing; Introduction to Graph Theory; Basic Graph Algorithms: traversals and shortest path; Random numbers: generation, sampling, Monte carlo simulations, bootstrapping; Direct search algorithms; Introduction to DNA computing

Text Books:
1. Gries P, Campbell J, and Montojo J (2013) Practical Programming: An Introduction to ComputerScience Using Python 3 (Pragmatic Programmers). Pragmatic Bookshelf, 3/e. ISBN97893511046982. Goodrich MT, Tamassia R and Goldwasser MH(2013) Data Structures and Algorithms in Python.Wiley, 1/e. ISBN 11182902753. Compeau P and Pevzner P (2014) Bioinformatics Algorithms: An Active Learning Approach. Active Learning Publishers, 1/e. ISBN 0990374602

Reference Books:
1. Horowitz Ellis, Sartaj Sahni, Sanguthevar Rajasekaran (2007) Computer Algorithms, 2/e, Silicon Press 2. Thomas H. Cormen, Charles R. Leiserson CR, Ronald L. Rivest, Clifford Stein (2009), Introduction to Algorithms, 3/e, Prentice Hall India 3. Skiena SS (2010) The Algorithm Design Manual, Springer, ISBN 1849967202

Pre-requisite Course:

	CourseNo	Course Name		CourseNo	CourseName
			or		

			or		
Course 2			or		
			or		
Course 3			or		
			or		