CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. COMPUTER SCIENCE

ELECTIVE COURSE					
COURSE CODE	COURSE TITLE	CONTACT HRS/WEEK			CREDITS
		LEC	LAB	TUT	
CSC5008	Computational Biology	2	2	1	4

Lec = Lecture, Tut = Tutorial, Lab = Practical

This is a participatory, experimentally and problem solving **skill development course**.

Course Objective:
The objective of the course is to provide theoretical and practical aspects of developing computational techniques needed for biology.

By completing this course, students will obtain the following course/learning outcomes:
1. Knowledge gained:
   (i) mathematical concepts of computational biology
2. Skill gained:
   (ii) Critical analyzing and logic skills in developing computational algorithms.
3. Competency gained:
   (iii) Computational biology modelling and applications

Prerequisites: Basic knowledge of programming

Grading:

Lab implementation	– 15%
Participatory based group Project	– 10%
Assignment/Quiz/presentation	– 5%
Class Test	– 10%
Final Exam	– 60%

CSC5008 – Computational Biology

Module 1
Introductory Molecular Biology, DNA Analysis, Regulatory Motifs in DNA Sequences, Finding Motifs, Greedy Approach to Motif finding, Longest Common Subsequences, Global and Local Sequence Alignments, Multiple Alignment

Module 2
Gene Prediction, Constructing Algorithms in sub quadratic time, Shortest Superstring Problem

Module 3
Sequencing by Hybridization, Protein Sequencing and Hybridization, Spectrum Graphs, Spectral Convolution, Repeat Finding, Hash Tables, Keyword Trees, Suffix Trees and its Applications

Module 4
Approximate Pattern Matching, Hierarchical Clustering, Evolutionary Trees, Parsimony Problem, Hidden Markov Models, Applications of HMM.

Text books:
1. N. C. Jones, P. A. Pevzner, An Introduction to Bioinformatics Algorithms, MPI Press, 2004.
2. D. W. Mont, Bioinformatics: Sequence and Genome Analysis, CSHL Press, 2004.

Reference Books:
3. D. Gusfield, Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, Cambridge University Press, 1997.